

# HORTICULTURAL ABSTRACTS

Vol. XIII

September 1943

Nos. 3

Initialled reviews are by W. A. Roach and H. Wormald of the East Malling Research Station. Initialled abstracts by J. E. Christiansen, W. B. Hewitt, L. M. Smith and H. H. P. Severin are included by courtesy of the Editors of "Biological Abstracts".

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## MISCELLANEOUS.

### Growth substances.

673. LANDAU, N. 577.15.04: 631.531.17  
The effect of hetero-auxin on the germination of some seeds.  
*Palestine J. Bot. (J.)*, 1940, 1: 409-12, bibl. 12.  
Heteroauxin was found to stimulate germination of oats, French beans, tomato and radish seeds at concentrations of  $10^{-7}$  and  $10^{-9}$ . It is suggested that different varieties may react in a different way.

674. KIESSELBACH, T. A. 577.15.04: 631.531  
Crop response to hormone seed treatments.  
*J. Amer. Soc. Agron.*, 1943, 35: 321-31, bibl. 8.  
Tests conducted on the Agronomy Farm, Lincoln, suggested the conclusion that hormone seed treatment cannot be recommended for any farm crop in Nebraska.

675. ADDICOTT, F. T. 581.162.3: 577.15.04  
Pollen germination and pollen tube growth as influenced by pure growth substances.  
*Plant Physiol.*, 1943, 18: 270-9, bibl. 8.  
Of 33 pure growth substances tested, 16 had a stimulating effect on the germination or the pollen tube growth of *Tropaeolum majus* and *Milla biflora*. It was found that the phenomena of germination and tube growth are not necessarily related, since some of the stimulants affected only one of them.

676. COMMONER, B., FOGEL, S., AND MULLER, W. H. 577.15.04: 633.491  
The mechanism of auxin action. The effect of auxin on water absorption by potato tuber tissue.  
*Amer. J. Bot.*, 1943, 30: 23-8, bibl. 16.  
BONNER, J. 577.15.04: 577.16  
Effects of application of thiamine to *Cosmos*.  
*Bot. Gaz.*, 1943, 104: 475-9, bibl. 8.

### Physiology.

677. HEINICKE, A. J. 631.8: 581.1  
The physiology of trees with special reference to their food supply.  
*Proc. 15th nat. Shade Tree Conf., New York*, 1939, pp. 26-38.  
Regeneration of roots may occur in a soil atmosphere of 5% oxygen, but far more renewal is found where the oxygen concentration is 15-20%. Where the soil pores are saturated with water, especially in early spring in the deeper layers of more compact soils and where consequently aeration is poor, the root system will be insufficiently developed. The top of the tree responds by production of shorter shoots and smaller leaves. The remedy is drainage. Little nitrogen and mineral matter is absorbed at the lower levels of oxygen concentration. At Cornell University, Ithaca, the production of carbohydrates by a mature apple tree was determined during different months and at different periods of the day and the results are given in a table. About 500,000 cu. ft. of air were required daily to furnish the  $CO_2$  needed for 1 lb. of carbohydrates. Further tables provide data on assimilation and light, on the influence of temperature on the rate of apparent photosynthesis, and on the increase of food production by the leaves of a starved tree after the application of nitrogen. A tree will use more than twice as much food for respiration at 80° F. as at 50° F. Low autumn temperatures are favourable for the development of good colour and high quality of fruit. In an experiment light green leaves produced carbohydrates at the rate of 4.1 mg. hr. per 100 cm<sup>2</sup>, while dark green leaves showed an average rate of 12.1 mg. hr. per 100 cm<sup>2</sup>. Accumulation of reserve material in the leaf blades results in a reduction of photosynthetic activity. Leaves of ringed branches produce only 30-50% of the normal rate. During the year that the tree is bearing a crop the foliage produces more food than in an off year. In the discussion following the paper it was shown that spraying with lime-sulphur



deeply affects the photosynthetic mechanism. Apparently, the film on the leaf is not so much responsible as the chemical effect. Wettable sulphurs are less harmful. Trees grown in sod are liable to suffer from lack of nitrogen which can, however, be supplied by mowing the grass cover and leaving it *in situ*.

678. WENT, F. W. 581.148.5

**Some physiological factors in the aging of a tree.**

*Combined Proc. 18th nat. Shade Tree Conf., Chicago, 1942, pp. 330-4.*

The effect of aging in a tree can be summarized as a result of an increasing drought condition. Measurements have shown a rapid decrease in the availability of water to leaves as the tree grows older. The death of sequoias, which form an exception to this rule, appears to be caused only by external agents. Leaves will remain small and buds will not develop as water resistance increases with age. In trees this increase of water resistance becomes critical only after they reach an age which varies from twenty-five to several hundred years. In shrubs and small trees, where the critical stage is reached much sooner, judicious pruning can double or treble the normal life span. The translocation of food and hormones is subject to an increased resistance with age to the same extent as water. Waterplants and plants with creeping rhizomes do not change the conditions in the tissues about the growing point. This seems to indicate that no toxic substances are accumulated in the growing points of plants.

679. WOHL, K., AND JAMES, W. O. 581.12

**The energy changes associated with plant respiration.**

*New Phytol., 1942, 41: 230-56, bibl. 63.*

During the mature phase almost 100% of the energy released in respiration escapes as heat. During the period of growth the release of heat falls short of 100% as energy is fixed by the reactions of synthesis. The heat produced is to be regarded merely as an end-product of metabolism. When the free energy relations of biologically important reactions cannot be ascertained, the heat of reaction together with some semi-quantitative rules provides a substitute and affords an indication whether a given reaction can take place. The free energy required for the performance of synthesis within the minute subdivision of the metabolic reactions is usually supplied by oxidation. The small amount of energy involved in vital processes such as organization, salt accumulation, cell division, plasma rotation, etc., is obtained indirectly from respiration. The large turnover of anaerobic respiration is almost useless for the plant, since the reaction-sequence is unsuitable.

680. MAGNESS, J. R. 581.11: 634.9

**Water relations to plant growth.**

*Proc. 17th nat. Shade Tree Conf., Washington, D.C., 1941, pp. 35-45.*

Water relations to plant growth are discussed and some practical applications to shade tree management are given.

681. WARNE, L. G. G. 581.11

**Transpiration experiments. The measurement of the evaporating power of the air.**

Reprinted from *Sch. Sci. Rev.*, 1943, No. 93, pp. 3.

The evaporating power of the air can be measured very simply with a wet- and dry-bulb thermometer. The first will indicate lower temperatures than the latter owing to transpiration. The difference of temperature provides a rough measure of the relative humidity of the air. In a table the author gives the saturation deficit value for the difference between the readings of the two thermometers from 0° to 30° C. The saturation deficit value determines the evaporation power of the air with regard to transpiration.

682. WITHROW, A. P., AND WITHROW, R. B.

581.145.1: 589.98

**Translocation of the floral stimulus in *Xanthium*.**

*Bot. Gaz.*, 1943, 104: 409-16, bibl. 6.

Transfer of the floral stimulus in *Xanthium pennsylvanicum* across an inarch contact took place only when tissue union between donor and receptor plant was established and uninterrupted for more than 4 days. Experiments demonstrate that in a two-branched plant the stimulus is transferred from an induced donor branch to a receptor branch only when the bark is intact. Translocation occurs both up and down the stem.

683. ESAU, K. 581.14

**Origin and development of primary vascular tissues in seed plants.**

*Bot. Rev.*, 1943, 9: 125-206, bibl. 215.

The author re-examines the data which workers have used in formulating their concepts of vascular differentiation and re-evaluates the terminology that has been and is being developed in the literature on vascular ontogeny.

684. MATHER, K. 581.162.3

**Mating discrimination in plants.**

*Endeavour*, 1943, 2: 17-21, bibl. 3.

A brief article on pollination with examples of the pollinating mechanism of certain plants; illustrated by a series of excellent photographs.

685. SEIFRIZ, W. 581.11

**Protoplasmic streaming.**

*Bot. Rev.*, 1943, 9: 49-123, bibl. 225.

A review of the literature on the phenomenon known as protoplasmic streaming in plants, with a critical examination of the views put forward by various writers, Corti, 1772, being recognized as its discoverer.

686. EYSTER, H. C. 581.11

**Osmosis and osmotic pressure.**

*Bot. Rev.*, 1943, 9: 311-24, bibl. 159.

Analysis of various textbooks of botany, plant physiology, animal physiology and chemistry reveals that there are four definitions of osmosis commonly in use. The author gives long lists of supporters among technical writers for each of these definitions and suggests that uniformity might be obtained if it were agreed to define osmosis as diffusion of a solvent (water) through a membrane. The passage of solute molecules through a membrane could be called dialysis. Osmotic pressure concepts are even more confused. A list of eight definitions and of their supporters is presented. It is recommended that the term osmotic diffusion pressure should be used to express the diffusion pressure of a solvent diffusing through a membrane as a substitute for such terms as suction tension, suction force and diffusion pressure deficit, while osmotic pressure could be used to designate a potential maximum hydrostatic pressure.

687. BLOCH, R. 581.4

**Polarity in plants.**

*Bot. Rev.*, 1943, 9: 261-310, bibl. 287.

A review of the main facts concerning the phenomena and experimental modifications of polarity in plant organs, tissues and cells.

688. TINCKER, M. A. H. 581.142

**Recent work on germination.**

Reprinted from *Proc. Linn. Soc. Lond.* 1941-42,

Session 154, pt. 2, 1943, pp. 167-82, bibl. 99.

Recent work is dealt with under the following headings: — Longevity and storage conditions; hard seeds; after-ripening and stratification; epicotyl dormancy; alternating temperatures and grasses; light; oxygen; size and maturity



of embryo; examples of chemical stimulation and inhibition; growth substances; fungal invasion; soil and high temperatures; miscellaneous; seed germination and lunar phases; rapid methods of determining viability; cytology and dormancy; seed treatments and aftergrowth.

689. EVENARI, M., KONIS, E., SROELOV, R., AND VAHL, I. 581.142

**On germination inhibitors.**

*Palestine J. Bot. (J.)*, 1940, 2: 1-37.

(I) EVENARI, M.

**Introduction**, pp. 1-5, bibl. 18.

The literature on germination inhibitors is reviewed and the object of the investigations, carried out at the Hebrew University of Jerusalem, is defined. A further paper on the chemical isolation of the germination inhibitors is to be published in the next issue.

(II) KONIS, E.

**On the action of germination inhibiting substances in the tomato fruit**, pp. 6-27, bibl. 13.

Tomato juice of the variety Stafford's Immune, possessing the strongest inhibiting qualities of all varieties on the Palestine market, was used in the experiments. The inhibition effect, extending to all stages of seedling development, is characterized by a reduced number of germinating seeds, a reduced rate of germination, a greatly retarded rate of seedling development and a deformation of the seedlings. Osmotic pressure and acidity of the juice could be excluded as primary causes of the effect. Imbibition and swelling of the seed, respiration, and the activity of diastase are not appreciably affected by the inhibition. The inhibition effect varied with the concentration of the juice, disappearing at very low concentration; it was replaced by a stimulating effect at still higher dilutions. Since dialysis removed the inhibiting factor, but not the stimulating agent, it is considered possible that two separate factors are involved. Experiments revealed that the inhibitor is volatile, crystalloidal and thermolabile, being destroyed at 60°. It was adsorbed on animal charcoal from solution as well as from a gaseous milieu. It is suggested that in the tomato inhibition may be effected by ethylene. Tomato juice inhibited also the germination of cereals, the degree of decreasing effect being oats>barley>wheat>maize.

(III) VAHL, T.

**Germination inhibitors in the fruit of *Poterium spinosum* L.**, pp. 28-32, bibl. 1.

The fruit of *Poterium spinosum* contains a substance or substances inhibiting germination. Suitable adsorbents (as charcoal or talcum powder) adsorb and remove the inhibitor from the fruit. The inhibitor seems to be of a volatile nature. [Author's summary.]

(IV) SROELOV, R.

**Germination inhibitors of *Sinapis alba* and other seeds when enclosed in the fruit**, pp. 33-7.

The beak, valves and pedicel of *Sinapis alba* were found to contain a germination inhibitor which is thermostable and water soluble. The effect increased with increasing concentration. The seeds of *Sinapis alba*, *Eruca boveana*, and *Matthiola bicornis* did not germinate within their closed beaks. Seeds germinated poorly when near their fruit coat or within the open fruit as compared with seeds germinating in the absence of fruit coats. *Ephedra campylopoda* seeds germinated only when entirely outside the fruit.

690. WATSON, R. W. 576.31

**The effect of cuticular hardening on the form of epidermal cells.**

*New Phytol.*, 1942, 41: 223-9, bibl. 23.

LEWIS, D.

581.162.3

**The physiology of incompatibility in plants. II. *Linum grandiflorum*.**

*Ann. Bot. Lond.*, 1943, 7: 115-22, bibl. 9.

PIERCE, E. C., AND APPLEMAN, C. O. 581.11

**Rôle of ether soluble organic acids in the cation-anion balance in plants.**

*Plant Physiol.*, 1943, 18: 224-38, bibl. 23.

NORTHEN, H. T.

581.192: 577.4

**Relationship of dissociation of cellular proteins by incipient drought to physiological processes.**

*Bot. Gaz.*, 1943, 104: 480-5, bibl. 44.

RUDORF, W.

576.312.35

**Die Bedeutung der Polyploidie für die Evolution und die Pflanzenzüchtung. (The significance of polyploidy for evolution and plant breeding.)**

*Angew. Bot.*, 1943, 25: 92-114, bibl. 80.

A review of the literature on polyploidy.

*Growth and metabolism.*

691. WOOD, J. G., AND PETRIE, A. 581.192

**Studies on the nitrogen metabolism of plants.**

**V. The relation of carbohydrate content to protein synthesis in leaves.**

Reprinted from *Aust. J. exp. Biol. med. Sci.*, 1942, 20: 249-56, bibl. 26.

External application of sucrose gave an increase of carbohydrates within the same nitrogen treatment. Increased application of ammonium salts resulted in a decrease of carbohydrates within the same sucrose treatment. Protein content is only related to carbohydrate content to this extent, that the latter decreases in amount as the protein content increases. Protein increases with increased external supply of ammonia, but there is no relationship between amount of ammonia and amount of protein present within the cell. 90% of the variance of protein is accounted for in terms of amino-acids and water contents. It is suggested that proteins are synthesized from the whole of the amino-acids in the cell.

692. FRAZIER, J. C. 632.51: 581.144.2

**Nature and rate of development of root system of *Convolvulus arvensis*.**

*Bot. Gaz.*, 1943, 104: 417-25, bibl. 12.

Field bindweed plants sown in typical Kansas upland loam soil and growing free from competition were studied for over two years. In the first year the area covered by a plant had a radius of 10½ feet. In the course of the third year the radius had extended to 17 feet. At the same time the vertical roots had reached a depth of 14-16 feet, in one case of 23 feet. Shoots arise from the root by way of a root-borne bud, either directly or from rhizomes, which in their turn originate from such buds.

693. DAY, D. 635.64: 581.144.2

**Growth of excised tomato roots in agar with thiamine plus pyridoxine, nicotinamide or glycine.**

*Amer. J. Bot.*, 1943, 30: 150-6, bibl. 23.

Roots did not grow in a modified Pfeffer's solution + 10% sucrose + 0.5% agar unless suitable growth substances were added. The best addition to the basic medium proved to be pyridoxine + thiamine. In this medium, root tips grew at the rate of about 5.2 mm. a day, appearing healthy and vigorous. Growth in a solution without agar is more rapid.



694. HOHENSTATTER, E. 547.313.2: 581.14  
Untersuchungen über den Einfluss des Äthylens auf Lebensvorgänge in der Pflanze. (Investigations into the influence of ethylene on vital processes in the plant.)  
*Beihefte Bot. Zbl.*, 1941, Heft 1/2, pp. 83-119, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 95.  
The changes produced by ethylene were studied in peas, beans, maize and wheat. Growth in thickness due to an enlargement of rind and pith cells was observed. The development of the vascular bundles was retarded, but was adjusted later in further cultivation. Prolonged gassing produced a check in growth which was replaced by a stimulating effect when gassing ceased. Ethylene was conducted from the shoot to the root and vice versa.
695. MAGISTAD, O. C., AND OTHERS. 663.61: 581.084.1  
Effect of salt concentration, kind of salt and climate on plant growth in sand cultures.  
*Plant Physiol.*, 1943, 18: 151-66, bibl. 11.  
In three districts of California with distinctly different climates 13 different crops were grown in large sand cultures. The best growth took place in a solution of 0.3-2.0 atmospheres. The reduction in yield with increasing salt concentrations beyond the optimum is often linear when plotted on an osmotic basis or on the basis of conductivity, both amounting to the same. The specific ion effects as studied for the salts of calcium, magnesium and sodium are of a secondary order compared to the effect of total salt concentration. In the case of certain crops chlorides were slightly more toxic than sulphates, and sodium did not appear to be unduly toxic. With most crops the reduction in yield was greater under warm than under cool climatic conditions if grown at the same salt concentration.
696. WILSON, J. K. 631.84: 581.192  
Nitrate in plants: its relation to fertilizer injury, changes during silage making, and indirect toxicity to animals.  
*J. Amer. Soc. Agron.*, 1943, 35: 279-90, bibl. 14.  
The nitrate content of the sap of 56 genera was determined colorimetrically. Different amounts of nitrate were accumulated by various species from the same habitat. The alleged relations of a high nitrate content to disturbances to man and beast are discussed.
697. PRESTON, R. J., JR. 581.144.2  
Anatomical studies of the roots of juvenile lodgepole pine.  
*Bot. Gaz.*, 1943, 104: 443-8, bibl. 12.  
LUND, A. P., AND SANDSTROM, W. M. 634.972: 631.531: 581.192  
The proteins of various tree seeds.  
*J. agric. Res.*, 1943, 66: 349-55, bibl. 10.  
American elm, varieties of oak and ironwood (*Ostrya virginiana*) seeds.  
MOYER, L. S., AND FISHMAN, M. M. 581.192: 587.36  
The chlorophyll-protein complex. II. Species relationships in certain legumes as shown by electric mobility curves.  
*Bot. Gaz.*, 1943, 104: 449-54, bibl. 18.  
GRAHAM, E. R., AND ALBRECHT, W. A. 631.84  
Nitrate absorption by plants as an anion exchange phenomenon.  
*Amer. J. Bot.*, 1943, 30: 195-8, bibl. 4.  
KEMPTON, J. H. 612.014.44: 633.15  
Differential effect of nutrient solutions on the size of various parts of maize seedlings grown in the dark.  
*J. agric. Res.*, 1943, 66: 183-228, bibl. 8.  
SMITH, J. H. C. 581.11  
Molecular equivalence of carbohydrates to carbon dioxide in photosynthesis.  
*Plant Physiol.*, 1943, 18: 207-23, bibl. 18.
- WHITE, P. R. 635.64: 581.144.2: 577.15.04  
Further evidence on the significance of glycine, pyridoxine and nicotinic acid in the nutrition of excised tomato roots.  
*Amer. J. Bot.*, 1943, 30: 33-6, bibl. 11.
- Laboratory technique.
698. SCHLENKER, F. S. 581.192  
A system of analysis for plant tissue by use of plant juice.  
*Plant Physiol.*, 1943, 18: 141-50, bibl. 31.  
The author briefly describes how many of the chemical methods for the analysis of plant juice can be adapted to the analysis of other types of plant tissue. He notes that the nitrate and sugar methods cannot be used with alcohol or water extracts if a visual colorimeter is used.
699. MOINAT, A. D. 631.548: 631.432  
An auto-irrigator for growing plants in the laboratory.  
*Plant Physiol.*, 1943, 18: 280-7, bibl. 5.  
An irrigator is described which by means of a porous clay plate guarantees fairly equal distribution of moisture throughout the soil. It consists of a container with gravel at the bottom and a layer (say 25 in.) of sand on top. A porous clay plate embedded in the surface of the sand supports the soil in which the plant grows. Water is conducted by tubes from a reservoir above the container down to the gravel and rises from there through the capillary columns of the sand up to the plate, diffusing through it into the soil. By varying the depth of the sand or its grade the moisture content of the soil can be adjusted as required. Soil moistures of between 20%-30% were found to be distributed uniformly within 2.5%. At soil moistures near the wilting point soil samples taken from close to the plate may not represent the actual moisture available to roots, in contact with the plate. With the Bouyoucos electrical resistance apparatus, soil moisture conditions could be studied without disturbing the soil; this method, however, proved less accurate at the higher moisture contents.
700. FIFE, J. M. 631.847.2  
An apparatus for studying respiration of *Azotobacter* in relation to the energy involved in nitrogen fixation and assimilation.  
*J. agric. Res.*, 1943, 66: 229-48, bibl. 15.  
A differential calorimeter was rebuilt so that the heat and carbon dioxide liberated by a culture of bacteria could be measured simultaneously over the entire range of oxygen partial pressures from 0.001 to 1.0 atmosphere. *Azotobacter* produced the maximum amount of heat possible from the oxygen utilized. The efficiency of oxygen utilization per living cell remains constant with increasing age of culture. [From author's summary.]
701. LEMMON, P. E., BROWN, R. L., AND CHAPIN, W. E. 631.459  
Sulfuric acid seed treatment of beach pea, *Lathyrus maritimus*, and silvery pea, *L. littoralis*, to increase germination, seedling establishment, and field stands.  
*J. Amer. Soc. Agron.*, 1943, 35: 177-91, bibl. 12.  
Beach pea and silvery pea are useful for control of shifting sand and soil erosion. A sulphuric acid treatment of the seeds for 20 and 30 minutes respectively resulted in a saving of 39% and 24% of seed cost.
702. WOOLLEY, D. W. 635.655: 581.192  
Isolation and partial determination of structure of soy bean lipositol, a new inositol-containing phospholipid.  
*J. biol. Chem.*, 1943, 147: 581-91, bibl. 14.  
OLSEN, S. R., AND SHAW, B. T. 631.83: 581.192  
Chemical, Mitscherlich, and Neubauer methods for determining available potassium in relation to crop response to potash fertilization.  
*J. Amer. Soc. Agron.*, 1943, 35: 1-9, bibl. 17.



## General.

703. SHISHKIN, B. 633/635

The work of Soviet botanists.  
*Science*, 1943, 97: 354-5.

A brief account of research work bearing on the war carried out by Russian botanists. The author is Director of the Institute of Botany of the Academy of Sciences, U.S.S.R. Supervision and instruction is given in preparing large quantities of sphagnum moss wound dressings which have considerable healing properties. Fir balsam valuable in the treatment of fresh wounds is prepared from the forests. The study, collection and delivery of wild rose hips and wild green walnuts for their vitamin C content has been organized, as also has the mass production of vitamin C concentrate from the unlimited quantity of pine needles available. Vitamin C from the latter source proved valuable against scurvy in the siege of Leningrad. Attention has been drawn to the number of wild plants that can be used as salads or whose roots produce starch and inulin or that have useful fruits. Flours produced from dried rowan berries and from bird cherries both gave good results when added to ordinary flour. Substitutes among the wild flora have been found for tea and coffee. A pamphlet giving details of all wild edible plants has been prepared for use of troops operating behind the enemy lines.

704. WALTHER, H. 63
- 
- Die Farmwirtschaft in Deutsch-Südwestafrika.
- 
- Ihre biologischen Grundlagen. (Farming in
- 
- Southwest Africa. Its biological foundations.)
- 
- No. 1-4 of series
- Deutsche Forscherarbeit in  
Kolonie und Ausland*
- , P. Parey, Berlin, 1940/41,
- 
- pp. 142, RM. 3, from review
- Angew. Bot.*
- , 1943,
- 
- 25: 199-200.

The content is arranged under the four headings: 1. Climate and the effect of climatic change on pasture management.

2. Pasture management, improvement of pastures, provision of water, and control of soil erosion. 3. Agriculture and fruitgrowing. 4. The nutrient value of South-West African grasses and food shrubs.

705. LAMOUR, R. 631.67: 551.56
- 
- Influence des cultures irriguées sur le climat.
- 
- (Influence of irrigated crops on climate.)
- 
- Fruits Primeurs*
- , 1941, 11: 124-5.

From examination of meteorological data, chiefly Californian, it is concluded that the only effect irrigation can have on the climate is that of a reduction of wind velocity due to the protection provided by the irrigated plantations as they increase in height and number.

706. ANON. 632.97: 351.823.1
- 
- Anleitung für Exporteure von Pflanzen und
- 
- Pflanzenteilen nach Schweden. (Regulations governing
- 
- the import of plants into Sweden.)
- 
- Flygbl. Växtskyddsanst. Stockh.*
- , 1937, No. 37,
- 
- pp. 8.

MÜNDEL, G. 631.432  
Ein Beitrag zum Problem des relativen Wasserver-  
brauches unserer landwirtschaftlichen Nutzpflanzen.  
(The problem of relative water consumption  
of our economic plants.)  
*Bodenk. PflErnähr.*, 1942, 26: 269-92, from  
abstract *Forschungsdienst*, 1942, Vol. 14, abstr.  
p. 75.

GISCAFRÉ, L., AND RAGONESE, A. E. 589.98: 616.21.002.193  
Importancia del género *Ambrosia* como factor  
responsable de polinosis en la provincia de Santa  
Fe. (The genus *Ambrosia* as a source of hay  
fever in Santa Fe province, Argentina.)  
*Darwiniana*, 1942, 6: 31-44, bibl. 14.

## TREE FRUITS, DECIDUOUS.

## General.

707. NILSSON, F. 634/635
- 
- Statens trädgårdsförsök, dess organisation och
- 
- nuvarande verksamhet. (The State Horticultural
- 
- Research Service, its organization and present
- 
- activities.)
- 
- Sverig. pomol. Fören. Årsskr.*
- , 1941, 42: 5-16.

An account is given of the establishment of the State Horticultural Research Institute at Alnarp following a decision by the Riksdag in 1937 that a special State institution for research work in horticulture should be set up in Sweden. In addition to the Institute at Alnarp three large sub-stations have been erected, and a number of smaller sub-stations have been planned.

As early as 1937 experiments were begun at Alnarp with material which had been arranged beforehand by Professor C. G. Dahl and which it was possible to plant out before the State Experiment Service had officially begun its work. A varietal and rootstock experiment with apples was initiated in which were included 6 different varieties which were tested on 9 rootstocks, the majority of which consisted of East Malling types with two rootstocks selected at Alnarp. Further a cultivation experiment with different kinds of fruit trees was planted, also pruning and manurial experiments with apple trees and a varietal experiment with raspberries. Since then a new varietal and rootstock experiment with apples has been planted and also a similar experiment with pears, in addition to which varietal experiments with raspberries, black currants and strawberries have been initiated. In the meantime a large number of new varieties have been bred and have been the subject of observation and in certain cases multiplication for more exact tests as to cultivation value. Experiments in planting,

spraying and storing have been conducted. In addition, extensive plant breeding work is being conducted with apples, pears and plums.

A brief account is given of the work at the sub-stations at Nyckelby, Rånna (here *inter alia* a rootstock experiment with cherries is to be planted at an early date including 10 varieties of cherries on two different rootstocks from East Malling), Söråker, Dingle and Ekerum.

Trials are also in progress on all kinds of annual vegetables. The most important hitherto have been varietal and strain trials.

During 1941 a series of seed production experiments was begun in east Scania, on Öland and Gotland. Their object is to ascertain the prerequisites for indigenous seed production of a number of different vegetables—carrot, onion, white cabbage, brussels sprouts, parsley, cucumber, and radish—Sweden's seed requirements of which have hitherto been to a very large extent imported. Finally plans for future work are described.

708. ANDREEV, V. N. 634.11
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- Kremenskaja cottage-laboratory. [Russian.]
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- Plod. jagodn. Kultury*
- , 1940, No. 3, p. 84.

A short account of work conducted, mainly on apples, at the field experimental station attached to the collective farm Pervenstvo in the Kuibishev territory of the U.S.S.R.

709. ANON. 634/635
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- Ein Institut für Obst- und Gemüseforschung in
- 
- Minsk. (An institute for fruit and vegetable
- 
- research in Minsk.)
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- Forschungsdienst*
- , 1942, Vol. 14, p. 357.
- 
- The Soviet Research Station is temporarily
- 
- functioning as a German institute.



710. HATTON, R. G. 634.1/7  
Fruit planting policy with special reference to quality of material.  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 42-6.

The present position with regard to the certification of small fruit plants, true to name and disease-free, is explained. At present growers may only plant approved strawberry runners and certified black currants. Owing to circumstances which are explained it is not possible to establish a raspberry certification scheme. Red currants and gooseberries are not yet included. The fruit tree rootstock position in Great Britain, Germany, France and Holland is reviewed. The opportunity for this country to re-establish a continental rootstock industry on a clean slate after the war is pointed out. Proposals for a scheme for fruit tree certification include the suggestion that all trees should be sold under a certification label including the name of the rootstock, and an outline is given of the way in which such certification might be worked. There is a need for properly co-ordinated replication under different environmental conditions of important trials, a system which, long and fruitlessly advocated in England, was in Germany at the outbreak of war in course of centrally controlled development.

711. HOBLYN, T. N. 634.1/7: 31  
The need for a fruit farm census.  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 47-51.

A more exact knowledge is required of the nature and extent of commercial fruit plantings in Great Britain as a basis for the better organization of the industry. Methods by which this might be obtained are examined. The most feasible would seem to take the form of a special return to be filled in by every grower, and based for tree fruits on the number of trees rather than acreage. Once the basic information had been obtained, crop forecasting for any one year would be simplified. Comment is made on the accuracy of the annual fruit forecast in Canada and on the sketchy and inaccurate estimates which are all that can be produced over here.

712. CLARK, J. A. 634.11  
Apple growing in Prince Edward Island.  
*Sci. Agric.*, 1943, 23: 251-6.

The article presents a historical survey of the development of apple growing in Prince Edward Island and suggests reasons for a decline which set in in 1920, but now appears, to have ended, partly owing to a strong local demand for dessert and culinary fruit. Brief comments are given on the most popular apples grown at various periods. Many of those grown so recently as 1929 are now considered distinctly inferior. The contents of certain reports and bulletins bearing on the subject, issued by the Charlottetown Experiment Station from time to time, are briefly summarized. In conclusion advice is given as to the methods of cultivation best adapted for coping with local climatic conditions.

713. REIMER, C. 634.22  
Kommersiell plommonodling särskilt med tanke på Skåne. (Commercial plum growing with particular reference to Scania.)  
*Sverig. pomol. Fören. Arsskr.*, 1942, 43: 29-76.

*Rootstocks.* Hitherto it has been supposed that by using St. Julien rootstocks one would obtain longer-lived plum trees with deeply penetrating roots, which would make the trees less susceptible to weather conditions and thus more hardy. They grow, however, very slowly. The best seed of *P. insititia* comes from France, St. Julien d'Orléans, and is very expensive. Bulgaria also supplies a large quantity of this seed, but it is not considered as good as the French. At Alnarp uniform and good rootstocks have been bred from indigenous seed, from the ungrafted, early, small-fruited so-called Larmåss plums (Spilling) and also from the ungrafted small blue plums, which are so common in some districts.

Nowadays *Prunus cerasifera* or the so-called myrobalan strains attract most attention, at any rate among Scanian plum growers. This rootstock is, however, not sufficiently hardy.

During the last few decades efforts have been made to produce vegetatively rootstocks suitable for Scanian fruit trees. The English Experiment Station at East Malling in particular has worked on this problem, but no very satisfactory results have been obtained.

*Shelter belts.* These are necessary for economic fruit cultivation in Scania with its high winds. Shelter belts can be planted in different ways, but in general they consist of two types of tree, the first a so-called nurse-tree, being a very quick-growing type, and the second which provides the future screen being of slower growth.

Another type of shelter belt, particularly suitable for a plum plantation, consists of myrobalan trees—*Prunus cerasifera* raised from seed—planted inside a hawthorn hedge. So that such a shelter belt may yield some slight profit, it may consist preponderantly of the variety Extra Early cherry—a variety which has proved quite hardy even during the last three severe winters—every fifth or sixth plant, on account of fertilization, consisting of seed-plants of myrobalan.

714. THOMAS, P. H. 634.21  
Apricot culture in Tasmania.  
*Tasm. J. Agric.*, 1943, 14: 4-9, bibl. 2.

The apricot growing industry of Tasmania, covering 1,350 acres, is concentrated in the south-eastern districts, particularly near Hobart. The most successful rootstock is myrobalan, which has proved resistant to wet conditions usually fatal to trees on apricot stock. Myrobalan unfortunately is longer than apricot in bringing its trees into bearing and it needs careful pruning for the first 10 years owing to vigorous development. Descriptions are given of 7 popular apricot varieties. The chief of these grown commercially is Moorpark (80%) which is valuable for its canning and drying qualities, its large size and good flavour. Its fault is an uneven ripening habit. New commercial plantings are spaced 16 to 20 ft. and intercropped with vegetables for the first years. Varieties are self-fertile, but setting is favourably influenced by calm weather at blossoming. The heavy winter pruning which has been customary leaves a large wound area and as a result much die-back from fungal infection has occurred. The method now advocated by the Department of Agriculture (*Bull.* 5 new series, The pruning of deciduous fruits), one midway between the "long" and "short" methods, has reduced die-back without affecting size and fruit quality. The semi-arid conditions (18-21 in. rainfall), the heavy black clay soil and the fact that the crops reach maturity within 100 days renders correct soil cultivation essential. The method is described. Nitrogenous manures have been found valuable in prolonging the growing period of the tree and thus checking the incidence of biennial bearing. Adequate thinning has recently been shown to have an even greater effect on fruit size and quality than manures. Fruit for canning is picked when the flesh is evenly coloured but firm. For the fresh fruit market on the mainland the fruit is picked in somewhat immature condition merging from pale green to yellow. A few notes on pests and diseases are given in conclusion.

715. ANON. 634.11  
A study of some phases of apple production in Southern New Jersey.  
*Bull. N.J. agric. Exp. Stat.* 703, 1942, pp. 3-16.

A committee was set up to study the factors underlying the alarming decline of apple production in Southern New Jersey. Economic problems such as capitalization and production costs are discussed. Excessive specialization and increased difficulty of pest control through the change from early to late varieties are regarded as chiefly responsible for the decline. Among suggestions for improvement



are the following: Proper rotation should be introduced; on light soils trees should be limited to a life of 25-30 years; Stayman, Delicious and Rome should be widely grown for colour; for most varieties the fruit should be thinned to 6-8 inches apart; low yielding trees should be eliminated; soil reaction should be kept above pH 6.0 by using lime which contains 3-6% magnesium oxide; interplanting of early and late varieties should be avoided from the stand-point of pest control. A system of tillage is suggested and various fertilizers are recommended.

### *Breeding and varieties.*

716. TATARINTSEV, A. S. 634: 575.127(43)

Research work at the plant breeding faculty of the Michurin Horticultural Institute.

*Plod. jagodn. Kultury*, 1940, No. 3, pp. 78-81.

Investigations are in progress on the growth of the pollen tubes and the development of the embryo in interspecific crosses such as apple  $\times$  pear, *Crataegus*  $\times$  pear, *Crataegus*  $\times$  apple, raspberry  $\times$  strawberry and the reciprocals. The pollen tubes of apple were capable of penetrating quite deeply into the style of the pear, though somewhat more slowly than the controls; some succeeded in penetrating to the embryo sac and effecting fertilization. The reciprocal combination was less successful; among 984 seeds produced in the apple  $\times$  pear cross only one had an embryo; in the reciprocal none had an embryo. *Crataegus* pollinated by apple or pear showed pollen tube growth only in the upper part of the style, as also in the raspberry  $\times$  strawberry crosses. Crosses are also being attempted between apple and *Sorbus* and between different species of *Grossularia*. Hybrid apple seedlings have been grafted on to a variety of mentors to observe the effect of different forms of apple, pear, quince, *Sorbus*, *Crataegus* and medlar. Investigations are also being made on such subjects as the interaction between the organism and the environment, vegetative *rapprochement*, crossing by means of pollen mixtures and the addition of the stigma of the pollinating species; the last two methods have increased the percentage set in crosses of sweet  $\times$  sour cherry and plum  $\times$  cherry.

717. LOZOVSKI, T. A. 634.11

Mass testing of the Michurin varieties of deciduous fruit. [Russian.]

*Plod. jagodn. Kultury*, 1940, No. 3, pp. 86-94.

This is a brief account of the large-scale testing of the Michurin and Chernenko varieties of apple. Besides its own field stations, the institute has established numerous plots on collective and state farms, in nurseries and agricultural schools throughout the European part of Russia. The appendix contains a detailed list, with addresses, of 100 localities in various territories of the Soviet Union where the work has been conducted since 1932.

718. NILSSON-EHLE, H. 634.11-1.523

Fortsatta arbeten på framställande av tetraploida äpplen. (The continuation of work on the production of tetraploid apples.)

*Sverig. pomol. Fören. Årsskr.*, 1942, 43: 25-8.

Late in the spring and in the early part of the summer the Swedish market is flooded with foreign varieties of apple. The need for good keeping varieties thoroughly adapted to Swedish conditions is emphasized.

Triploid varieties of apples (chromosomes 51), e.g. Ribston, Boskoop, Blenheim, on the average keep better than ordinary diploid varieties (chromosomes 34).

As previously pointed out by the writer in this journal (1938) the breeding of a large new selection of the triploid type cannot take place directly through the sowing of seeds of triploid varieties of apples, since their progeny (whether fertilization has taken place by diploid or triploid varieties) only too rarely contains new triploids.

If on the other hand tetraploid plants with the chromosome number 68 can be produced, the situation is quite different,

as through their fertilization by 34-chromosomed diploid varieties 51-chromosomed triploids should exclusively originate.

Reference is made to the production at Svalöf in 1937 of four different tetraploid plants of the triploid variety Boskoop. From the 1937 crop of Ribston (from the Kivik region, north-east Scania and Östergötland) 124,554 seeds were obtained, which gave rise to about 15,000 plants (germination of seeds of triploid varieties is only from 5 to 15%). One definitely tetraploid plant was obtained, and another similar plant, which is probably also tetraploid, has been marked.

One plant of the important triploid variety Gravenstein has been obtained which on good grounds can be presumed to be tetraploid, but of which the chromosome number has not yet been investigated.

One probable tetraploid plant of the triploid Canada Reinette has also been obtained.

Very great interest lies in converting diploid varieties into tetraploids by colchicine treatment. Dr. F. Nilsson has already succeeded in doing this with pears, and the Plant Breeding Institute for Fruit Trees now founded at Fjälkestad has set itself the same important task for apples also.

An interesting problem for the Plant Breeding Institute will be cultivation tests of the tetraploid varieties on different kinds of rootstocks.

As the production of these tetraploids was initiated six years before the Plant Breeding Institute at Fjälkestad began its work, it is to be hoped that the Institute will in the immediate future be able to start on a large scale the important, systematically arranged crosses between the tetraploids and best diploid varieties.

719. BOWMAN, F. T. 634.13-1.523

Inheritance and use of vigour in pear seedlings.

*J. Aust. Inst. agric. Sci.*, 1943, 9: 24-9, bibl. 6.

Some results obtained from controlled pollination under the pear breeding project of New South Wales begun in 1928 are discussed. The majority of pears that have fruited so far, unlike the majority of seedling apples, have been scarcely edible. Considerable use of open pollinated seedlings has been made in rootstock production and it is shown that to obtain vigorous seedlings for this purpose from local varieties attention must be given to the male as well as the female parent. For instance Williams would probably be the main source of commercial seed, being so extensively canhed. The variety is virtually self-sterile and there is scope for selection as regards the male parent, for instance Williams planted with Packham's, the usual combination, gives less vigorous seedlings than when it is crossed with Winter Cole or some other varieties of good inherent vigour. A number of combinations are mentioned resulting respectively in poor, medium or vigorous hybrids. Vigorous hybrids are produced by pollination between Packham's Triumph, Winter Nelis, Beurré d'Anjou, Doyenne du Comice, Winter Cole and Williams.

720. SHAW, J. K., AND SOUTHWICK, L. 634.11: 575.252

Somatic mutations in the apple.

*Science*, 1943, 97: 202.

A considerable number of reputed somatic variations of the McIntosh apple are being propagated at Massachusetts Experiment Station. Two produce apples of uniform red and are practically indistinguishable apart as regards all fruit or vegetative characters. They behave alike on most stocks, though one, Type G, starts growth rather more slowly from the inserted bud than the other, Type R. It was therefore curious to note that Type R was completely incompatible with the clonal stock Spy 227 whereas Type G on the same stock developed normally. Stayman and Winesap were also incompatible with Spy 227. Incidentally, the author remarks that although the striped form of McIntosh is generally considered the original there is evidence that the first McIntosh tree bore fully red apples.



721. KULIKOV, A. I. 575.257  
A vegetative hybrid of mountain ash. [Russian.]  
*Plod. jagodn. Kultury*, 1940, No. 3, p. 85.  
In 1932 the author grafted scions of a three-year-old *Sorbus melanocarpa* into the crown of an eight-year-old fruit-bearing *Sorbus aucuparia*; in the spring 1935 scions from the 1932 graft were similarly used on the same tree. Both grafts reached the fruit-bearing stage in 1935 and 1939 respectively, but, whereas the 1932 hybrids gave fruit and had leaves similar to *Sorbus melanocarpa* those of the 1935 hybrids resembled *Sorbus aucuparia* L. Further observations on the heritability of the above changes are promised in a future communication.
722. IL'INSKI, A. A. 634.1/5  
The wild growing fruit trees of Southern Daghestan. [Russian.]  
*Plod. jagodn. Kultury*, 1940, No. 3, pp. 40-8.  
In this report from the Daghestan horticultural and small bush fruit experimental station an account is given of economically important fruit trees growing in the wild state in the forests of North-Eastern Caucasus. Morphology and productivity of *Juglans regia* L., *Corylus avellana* L., *Malus* sp., *Pirus communis* L., *Cydonia oblonga* Mill., *Mespilus germanica* L., *Prunus divaricata* Ledeb., *Cornus mas* L. are discussed in some detail.
723. MARKOV, N. V. 634.21  
Wild apricots in the Alma Ata region. [Russian.]  
*Plod. jagodn. Kultury*, 1940, No. 3, pp. 49-51.  
From the 200 types recognized in the valleys and mountains of Central Asia, at an altitude of 1,200 to 1,400 m. above sea level, 28 varieties were selected for further experimental work by the Kazakh Agricultural Research Institute.
724. MCGILLIVRAY, K. D. 634.22  
Prune varieties from United States of America. Their commercial possibilities.  
*Agric. Gaz. N.S.W.*, 1943, 54: 168-72.  
Of the prunes imported from the U.S. and grown at experiment stations in New South Wales only two varieties, Coates and French Improved, show promise.
725. FRIDSTRÖM, A. 634.1/2  
Sortvalet beroende av tillfälligheter? (Haphazard or planned choice of varieties?)  
*Fruktodlaren*, 1942, No. 4, pp. 106-8.  
The cold winter of 1941/42 decimated the number of fruit trees in Sweden and lack of chemicals for disease and pest control has aggravated the position. Consequently the demand for young fruit trees is exceedingly heavy. The bulk of fruit trees being owned by home gardeners, the selection of varieties will largely depend on the advice of the expert nurseryman who supplies the trees. Experts are urged to sell only those recommended varieties which have proved hardy and otherwise suitable under local conditions. Great efforts are being made to build up a standard selection of varieties for every district.
726. PALMER, E. F. 634.1/7  
Fruit varieties. Recommendations. Variety distribution. Maturity dates. Pollination. Variety notes. Variety trials.  
*Bull. Ont. Dep. Agric.* 430, 1943, pp. 51-  
Varieties of tree fruits, grapes, and small fruits suitable for growing in Ontario are recommended and the variety distribution of certain fruits is recorded. Charts indicate the dates of first picking at the Horticultural Experiment Station, Vineland. Suggestions on the pollination problem are made and varieties of apples, pears, cherries, peaches, plums, grapes, blackberries, raspberries, red and black currants, gooseberries and strawberries are described in short notes. Finally, a list is given of all varieties under test at Vineland.
727. TOENJES, W. 634.11  
The new Close apple.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1942, 24: 321-2.  
A new, very early dual purpose variety.  
KLANG, C. A. 634.11  
Ingrid Marie, en värdefull äppelnyhet. (Ingrid Marie, a valuable new apple variety.)  
*Fruktodlaren*, 1943, pp. 41-3.  
A dessert apple of the Cox's Orange type.
- Propagation.
728. HARGRAVE, P. D. 631.537: 631.531  
Practical propagating results with nursery seed stocks.  
*Sci. Agric.*, 1943, 23: 327-31, bibl. 3.  
In 1936 the author in collaboration with J. S. Shoemaker published some results obtained largely in the laboratory on the germination of nursery tree and shrub stocks. [Propagating trees and shrubs from seed, *Circ. Alberta Univ.* 21, 1936.] The present paper reports results obtained in practical work at Brook, Alberta, and some modifications which have since been found necessary are tabulated, together with any special treatment required by the different species. Sand was found to be a better stratifying medium than peat moss, though liable to dry out if not watched. Peat-moss, excellent in many ways, injured the seed of prematurely germinating stocks, possibly because of its low pH value. The paper is replete with new and useful information.
729. EGGERS, E. R. 631.541.44 + 631.541.6  
Inarching—bridge-grafting—topworking.  
*Combined Proc. 18th nat. Shade Tree Conf. Chicago*, 1942, pp. 371-6.  
The technique of inarching is described at some length as shade tree maintenance demands its application. Bridge-grafting and topworking are also dealt with.
730. POPLAVSKII, K. M. 631.535: 634.11 + 634.13  
Root induction in apple and pear cuttings. [Russian.]  
*Plod. jagodn. Kultury*, 1940, No. 3, pp. 73-7.  
During June and July cuttings of one-year-old shoots of Antonovka apple and various Michurin and Chernenko apple and pear hybrids were deprived of their basal leaves and inserted in oil-cloth bags open at the upper end and containing sphagnum moss. The moss was saturated with Knopp's solution to which had been added as stimulators either a 10<sup>-4</sup> solution of potassium permanganate or a 0.00005 N solution of sulphanilic acid, or a saturated aqueous solution of ethylene. The permanganate and the ethylene solution proved the more effective. Callus began to form in from 10 to 60 days according to variety and the date at which the cuttings were treated. Cuttings planted direct from the trees rooted and grew better than those stored over the winter, which were also included in the experiment. After planting out the rooted cuttings were mulched and given a monthly watering with Knopp's solution + potassium permanganate, replaced later by a nutrient solution of ammonium nitrate, tricalcium phosphate and potassium carbonate, the total concentration not exceeding 2 g. per litre of water. Growth appeared to be enhanced by this treatment.
731. BRICHET, J. 634.63-1.53  
Pour régénérer et développer notre oliviculture. Plants issus de boutures ou plants issus de semis greffés. (Should selected olives be propagated from cuttings or grafted on seedling stock?)  
*Fruits Primeurs*, 1942, 12: 257-61.  
Four points on which olive growers in North Africa disagree are discussed. (1) Can races of olive supposedly degenerating through a long period of propagation by cuttings be



re-established through seed? To this an unqualified negative is given, the reasons, too obvious to quote here, being briefly stated. (2) Are plants grafted on seedling stock more resistant to disease and adverse conditions of soil and climate than cuttings? The former are thought to be longer lived. The answer is that there is no evidence that seedlings are more resistant than cuttings but that trees are sometimes vegetatively propagated in ignorance from diseased material and later themselves show infection. As regards longevity there are many trees centuries old in every olive-growing country, some propagated one way and some another, and from a commercial point of view does it matter if a tree lives 800 or only 500 years? (3) Seed-raised plants develop taproots giving them a better hold on inhospitable soils than is possible to the lateral-rooted trees produced by cuttings. The author points out that most of the Mediterranean countries have large areas of successful olive groves grown entirely from cuttings, especially in the plains, which are quite as good as the grafted wild stock commonly used in the mountain districts of the same countries. Furthermore, the olive is by nature at least as much a surface as a deep rooting tree and recent research is quoted to show that the taproot is completely useless in an anhydrous soil. In a stony or rocky soil unsuitable for surface crops and possessing fissures down which the roots can travel a seedling-grown and therefore taprooted tree may have its uses. (4) Do trees raised from cuttings and similar forms of vegetative propagation fruit more quickly than seedling trees? This is certainly true and accordingly all commercial plantations are grown from cuttings, so much so that it is practically impossible to buy a grafted plant in Algeria. This is to be regretted. There are large mountain forests of spontaneous wild trees some of which are grafted *in situ* by the natives, but without any special selection. Consequently the heterogeneity is pronounced. Some efficient form of State control in the matter of selection and grafting could turn these wild trees into a valuable asset.

732. GARNER, R. J. 634.1/2-1.542  
**Frameworking for increased fruit production.**  
*Ocas. Publ. sci. Hort.* 4, 1943, pp. 63-5, bibl. 4.  
 See previous articles, *H.A.*, 12: 1222 and others.

### Rootstocks.

733. BEVANÇON, L. 634.1/2-1.541.11  
 La production des porte-greffe en Algérie.  
 (Production of rootstocks in Algeria.)  
*Fruits Primeurs*, 1942, 12: 117-8.

Imports of rootstocks from France to Algeria have practically ceased. It is not possible to propagate locally myrobalan, quince or doucin or paradise apple stocks through lack of propagating material, but seedling stocks of certain fruits could be raised without difficulty. Instructions are given on the best way of raising seedling almonds, apricots and peaches. Some notes from the author's own observations include the following. If almonds are grafted the year following sowing rather than the same year the larger stocks should be discarded, since they transplant badly. Almonds are suitable stocks for all almond varieties and for many peaches, particularly very late varieties. Many plums do well on almond, including Prune d'Agen, Reine Claude and the Japanese plums Burbank, Santa Rosa and Wickson, provided the soil suits the stock and is neither too compact nor too wet. Almond is useless for apricot except for Luizet which has a special affinity for it. The seeds for apricot stocks are those of the common Mechmech, but the large-leaved, robust Bullida might easily prove a better stock, for Mechmech is said to be slow in growth and difficult to graft. Stratification of apricot seed is scarcely necessary. The shortage of myrobalan has driven nurserymen to substitute the free stock, a blessing in disguise, since myrobalan as a stock for apricot is quite unsuitable for reasons which are given. Apricot is a good stock for

peach and some plums, European and Japanese. Attempts to raise myrobalan and St. Julien plums from seed have all failed. Peach is a good stock for all peaches and for some plums, e.g. Jefferson, Yellow Egg, etc. There is in Algeria a flourishing plantation of Japanese plums on peach. Apricot on peach is very successful in Tunisia and California. Cherry stocks can be obtained from seeds of the wild or self sown cherries which are to be found in parts of Algeria. Young self sown seedlings are often dug up and used as stocks in the mountain districts.

734. PALMER, R. C. 634.11-1.541.11  
**Dwarf and semi-dwarf apple trees.**  
*Proc. Wash. St. hort. Ass.* 38th annu. Meet. 1942, 1943, pp. 39.

A brief account of the origin and selection of apple dwarfing rootstocks, especially of Malling types. The method of propagation at East Malling and the adaptation of the technique to suit conditions at the Summerland Experiment Station, British Columbia, are described.

735. LUCAS, I. B. 634.1/2-1.541.11  
**Dwarf fruit trees.**  
*Canad. Hort.*, 1943, 66: 85-6.

An article extolling the advantages of planting dwarf fruit trees in home gardens. Among the claims made is the freedom of dwarfs from biennial bearing and the fact that they 'crop readily and heavily almost every year (because they can be given the necessary attention without difficulty; neglected trees would soon start evil ways.—Ed.). To the question whether dwarfs are as hardy as standards the author replies that he has grown at Markdale, 90 miles N. of Lake Ontario, 1,725 ft. above sea level, 25 miles from any large body of water, regular crops of peaches, nectarines, apricots, the tender varieties of French pears, and apples in a district where only the hardier apples are expected to survive as standards. The explanation given is that the trees are not inherently harder but their lower growth enables them to escape biting winds since almost any object serves as a windbreak and they are frequently almost buried under snow. Dwarf peaches should be wrapped in burlap for winter. Farther north an absolute guarantee is provided against injury from temperatures of 40° below zero if peaches grown against a solid fence or building are additionally protected by leaning wooden covers in front of them. There are dwarfing stocks for apples and pears but even these will in some situations require pruning to keep them to the required size. Other fruits for which such stocks are not yet available are kept dwarf by certain types of pruning, by depressing the tips of leaders and by cultural practices such as withholding food, and water and restricting or confining the roots.

736. GREVE, E. W. 634.11-1.541.11  
**Rootstocks for apple trees.**  
*55th Trans. Peninsula hort. Soc.* 1941, 1942, pp. 36-8.

A review of results and indications of apple rootstock work in Eastern U.S.A. to date. In an experiment started at Dover, Delaware, in 1929 five apple varieties (20 trees in all) propagated on their own roots have so far yielded less than the same varieties (17 trees) on French Crab seedling roots. The Malling stocks XII and XVI have produced trees as large or larger than those on seedlings. Trials show that in evaluating any rootstock not only the stock itself but the stock-scion combination must be considered. Thus in N. York State Grimes Golden has done very well, but Gallia Beauty very poorly on Malling IX. Again in New York Malling I does well under wet and dry conditions. Trees on XII suffer during dry summers. The U.S. Department of Agriculture has also developed rootstocks, most of them producing large trees. These are being tested. Those interested in hardiness have been trying Virginia Crab and Hibernial as rootstocks. In the Midwest there was indication that Hibernial may be the hardier.



737. LOEWEL, E. L., AND KASSAU, H.

634.11-1.541.11

Das Verhalten bekannter Apfelstammbildner in der Baumschule. II. Mitt. (The behaviour of well-known apple stem builders in the nursery. II.) *Gartenbauwiss.*, 1942, 16: 373-8., from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 81.

In completing a previous account of apple stem builders the authors state that of all varieties only Roter Ziegler, Pomme d'Or, Noire de Vitry and Croncels proved satisfactory. (See also H.A., 12: 427, 428.)

738. SWARBRICK, T. 634.11-1.541.11: 663.3

The production of cider fruit on bush trees. Progress report 1942.

A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 13-7.

The trial previously reported a year ago (*Ibidem* for 1941, p. 11; H.A., 12: 796) consists of two parts. At Long Ashton there are 4 varieties, viz. Sweet Alford, Dabinett, Knotted Kernel and Stoke Red, on the 3 rootstocks Crab, M I and M IX. Of the trees on M I and Crab some have short stems about 2 ft. long and others stems about 4 ft. 6 in. long. These are planted in groups of 12, the minimum number of trees in any one combination being 36. The trees in the country series comprise variety trials in which there are 5 trees of 10 varieties growing on M I and Crab. All trees were planted in the winter of 1935/36. The effect of M IX in inducing quickness of yield is very noticeable at Long Ashton. Otherwise, so far no consistent effect of rootstock is noticeable. Of the 12 varieties which occur at most of the county centres, Broad Leaf Norman, Perthyre, Chisel Jersey, Yarlinton Mill and Bulmer's Norman have consistently been the highest yielders. The trial has already yielded useful information on varieties likely to grow and yield well as bush trees under varying conditions.

739. ZELENSKI, M. A. 634.13-1.541.11: 634.14

Quince rootstocks for pears under Caucasian conditions. [Russian.]

*Plod. jagodn. Kultury*, 1940, No. 2, pp. 96-8.

Scions of about 150 varieties of Russian, French, German, American, Italian and other pears were grafted on quince rootstocks at the Maikop Experimental Station in 1930. Most of the imported and some of the Russian varieties did not make good unions; their growth was slow, they showed poor resistance to cold, and gave low yields. Less than one half of them grew well and had come into effective bearing by 1938.

740. PLOCK, H. 634.21-1.541.11

Unterlagenfragen im Aprikosenbau. (Rootstock problems in the cultivation of apricots.)

*Dtsch. Obstb.*, 1942, Heft 7, pp. 123-4, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 82.

An account is given of the original habitat of the apricot (*Prunus armeniaca* L.). Many years' tests have caused the author to reject the use of St. Julien and myrobalan seedlings. Ackermannspflaume is frost resistant, long-lived, takes the scion well and causes good and early cropping. The apricot seedling of a frost resistant early variety with sweet kernel is often recommended as the best stem builder. Hauszwetsche as a stock produces medium vigour, the cropping of choice varieties being very good. White myrobalan used in Western Germany is characterized as frost resistant and compatible. The bitter almond gives satisfactory results as a stock on calcareous soils; it should be used only as a stem builder (1-70 m.). Where used as a stem builder Schöne aus Löwen came successfully through the winter of 1939/40. Kandler Zuckerzwetsche forms strong, straight stems. Hallaraspflaume and Wagenstädter Pflaume are not always satisfactory.

## Pollination.

741. PUSHKARSKII, S. D. 634.1/2: 581.162.3

Collection of pollen for hybridization. [Russian.]

*Plod. jagodn. Kultury*, 1940, No. 3, pp. 95-6.

The author gives a short account of a series of experiments, conducted during 1937 and 1938, to ascertain the best practical method of collection of pollen, and to study the effect of drying and/or desiccation on the rapidity of maturation and the rate of dehiscence of pollen sacs and on pollen viability. Unopened flower-buds of pear, apple and an unknown species of *Prunus* were divided into four groups: (1) a single layer of pollen sacs was placed in a Petri dish kept on a shaded window sill at 18-20° C.; (2) similarly treated, but placed immediately in a desiccator with CaCl<sub>2</sub>; (3) kept in the shade for 12 hours in a Petri dish, after which the pollen sacs were removed and left in the same receptacle; and (4) treated as (3) but removed after a period of 24 hours. Flowers of the same species but of different varieties emasculated 24 hours previously were pollinated with the material obtained under treatments (1) to (4). 94-8% of the flowers fertilized with pollen from (4) set as against 60% with pollen collected from (1). In 1938 the experimental series was repeated but the flower-buds were gathered when they were just opening; the greatest number of settings was obtained with treatment (2) and the least with (1).

742. AMBARCUMJAN, M. A. 634.25: 581.162.3

The part played by the bee in peach pollination. [Russian.]

*Plod. jagodn. Kultury*, 1940, No. 3, pp. 69-72.

Trials at the Armenian Horticultural and Green Crop Experimental Station established the paramount importance of bees for the production of a commercial crop of peaches. Orchards containing a number of different varieties of peach produced the best crops.

## Growth and nutrition.

743. BOIKOFF, D. 634.1: 581.145.1/2: 632.1

Beitrag zum Blühverlauf und Fruchtansatz beim Kernobst unter besonderer Berücksichtigung der Blütenempfindlichkeit gegen Kälte und Nässe. (The blooming and setting of pome fruit with special reference to the susceptibility of the flower to cold and wet weather.)

*Gartenbauwiss.*, 1943, 16: 384-427, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 83.

The effect of cold and wet weather on the blooming and setting of many pome fruit varieties was studied in the spring of 1938 and 1939. The number of flowers to the cluster differed in the two years. A temperature of 3° C. injured the flowers of all varieties under observation to a greater or lesser extent. The ovary was more severely affected than the anthers. As the flower developed susceptibility to frost injury increased, but frost resistance varied according to the variety. The anthers could stand wet weather better than the ovary, the pollen sticking to the stigma in spite of rain. Owing to insufficient pollination during the wet and cool weather 72% of pear varieties and 18% of apple varieties set under 5%.

744. BATON, W. D., AND MARSHALL, R. E. 634.1/7: 581.47

Some methods for approximate prediction of surface areas of fruits.

*J. agric. Res.*, 1943, 66: 357-73.

Linear relations, predicting equations and standard errors of estimate were determined for planimeter surface areas of apple and for each of the following measurements: Areas of transverse cross sections, areas of axial or longitudinal cross sections, transverse diameters, axial or longitudinal diameters and weights of fruits. The most practical predicting equation for approximate surface areas of



harvested apples is based on weights of fruits and the most suitable one for use on unpicked apples is based on transverse diameter of apples. Weights of pears and plums may be used for predicting surface areas of these fruits. [From authors' summary.]

745. BATJER, L. P. 634.11-1.55: 632.95  
Present status of blossom removal with chemical sprays.  
*55th Trans. of Peninsula hort. Soc. 1941, 1942, pp. 34-6.*

Tests were made with tar-distillate oil and di-nitro-ortho-cyclo-hexyl-phenol at one-third to one-half dormant strength on several apple varieties in 1940. Both sprays proved equally effective in reducing fruit set and yield, the one year with York Imperial being changed with a single spray to the succeeding year without the complete loss of a crop in 1940. Two spray applications resulted in the almost complete removal of fruit on average sized York Imperial and Stayman Winesap trees. The same sprays used on Yellow Transparent had little effect, but Elgetol was more effective in this case. No general recommendations can at present be made.

746. CHILDS, L., AND BROWN, G. G. 634.11-2.951.8  
Notes on tar oil usage as a factor in apple production.  
*Proc. Wash. St. hort. Ass. 38th annu. Meet. 1941, 1942, pp. 15-26, bibl. 3.*

The paper deals chiefly with results obtained in correcting biennial bearing in apples by the partial spraying of the tree with tar oil emulsion applied when about 10% of the blossom was open. Partial spraying consisted in spraying alternate large branches and was difficult to achieve with accuracy, in fact the technique of application is one of the most important features of the problem. The results in obtaining regular medium-sized crops each year were highly successful. Details of experiments are given.

### Cultural practice and manuring.

747. UPSTALL, W. H. 634.1/7-1.5  
Establishing the young orchard.  
*Bull. Ont. Dep. Agric. 433, 1943, pp. 18.*

Advice is given on location, site, and soil desirable for establishing an orchard in Ontario. Measures for the most favourable planting distances and certain rootstocks are recommended. The use of the planting board is explained. Young trees should be protected against mice by wire guards, and in districts where rabbits do a great deal of damage by wrapping them with burlap as high as the rabbits are likely to reach from snow banks or by the application of a repellent. This is made by adding slowly with constant stirring 12 lb. of finely broken lump resin to 1 gal. cold antifreeze alcohol, which is ethyl alcohol denatured with a small amount of wood alcohol. The repellent is not injurious to apple or pear trees, but there are no data available on its effects on plum, peach or cherry trees. Instructions on pruning are given at some length. During the first 3 or 4 years the orchard should be cultivated, but only until 1 July. In summer weeds provide a beneficial cover which may be mowed later if a drought occurs. There can be no objection to intercrops if they are kept beyond the spread of the branches and if cultivation ceases about 1 July.

748. WALLACE, T. 634.1/7  
The renovation of starved orchards by cultivation and manuring.  
*Occas. Publ. sci. Hort. 4, 1943, pp. 55-6, bibl. 1.*

The methods of renovation advocated do not apply to orchards neglected on account of frost, bad drainage or severe potash deficiency. An orchard suitable for renovation will show signs of having made good growth at some period of its history. Nitrogen starved conditions, usually

due to competition with grass and weed covers are shown by cessation of shoot growth, a red colour of the bark, small, sparse yellowish-green foliage, rapidly turning brilliant red in early autumn, premature defoliation, weak or absent fruit spurs, poor fruit set and small, highly coloured fruit. Such nitrogen-starved trees give a rapid response to suitable cultural treatment. The ground should be cleared of rough cover, the sod ploughed in in late autumn or winter, and disced or harrowed in spring and summer to keep the surface moved. A nitrogenous dressing, say 5 cwt. per acre nitro-chalk or sulphate of ammonia, should be broadcast prior to the first spring cultivation, further dressing being applied during summer to any specially poor patches. The routine is repeated the second year. If there is danger of excessive growth response the nitrogen application may be delayed until the results of cultivation are seen.

749. HARLEY, C. P., AND LINDNER, R. C. 634.11-1.8  
Apple tree responses to soil management practices.  
*Proc. Wash. St. hort. Ass. 38th annu. Meet. 1942, 1943, pp. 63-8.*

Sodium nitrate proved to be a satisfactory source of nitrogen for apple trees in sandy loam in north-central Washington. Autumn and early winter applications of sodium nitrate or ammonium sulphate were superior to spring or early summer applications in penetration to the effective root concentration zone. The full benefit of spring or summer applications was not obtained until the following year.

750. SPIVAKOVSKI, N. A. 634.11-1.8  
The effect of fertilizers on the rate of growth and the initiation of fruiting in the apple tree. [Russian.]  
*Plod. jagodn. Kultury, 1940, No. 2, pp. 22-40.*

Pot and field trials at Michurinsk between 1935 and 1939 showed that the N requirements of the apple tree increase gradually from spring to summer, there being an inverse ratio between the maximal rate of growth in May and June and the formation of fruit buds. N+P enhanced fruit setting but doubling or trebling the amount of N or P produced no increase in the number of flower clusters. The addition of NK and NPK had a beneficial effect both on cold resistance in general and winter hardiness in particular. Mulches improved the general condition and rate of growth of young trees; farmyard manure was found more efficacious than the full NPK but inferior to mulches: NPK + mulches gave the greatest rate of growth and the largest number of fruit. Deep application of NPK (fertilizer lance) was superior to surface treatment.

751. ANDREEV, V. N. 634.11-1.8 + 1.67  
The achievement of high yields in the apple orchard. [Russian.]  
*Plod. jagodn. Kultury, 1940, No. 2, pp. 69-71.*

Irrigation and adequate manuring, either mineral or organic, greatly increased apple yields in the Kuibishev area of Russia.

752. ANON. 634.1/7-1.8  
The orchard fertility problem during the war emergency.  
*Bull. Pa agric. Exp. Stat. 431, 1942, pp. 12.*

The scarcity of nitrogen fertilizers under war conditions makes it advisable in the national interests to grow legumes in the orchards. Tests carried out with apples for 34 years at the Agricultural Experiment Station, Pennsylvania, indicate that a fully satisfactory crop can be obtained without application of chemical nitrogen. Legume sods were kept under control by annual light harrowing or discing and by mowing, while annual legume covers were turned under in the spring and immediately reseeded. In peach orchards also nitrogen was supplied successfully in the form of an annual legume cover combined with a moderate addition of commercial nitrogen. Lime, potash and phosphate are necessary for good legume covers. It is



suggested that where commercial nitrogen fertilizer is used during the present emergency it should be applied in 3-4 foot rings round the trunks.

753. PROEBSTING, E. L. 634.1/8-1.87  
Fertilizers and covercrops for California deciduous orchards.  
*Circ. Calif. agric. Exp. Stat.* 354, 1943, pp. 1-15.

A brief, general discussion of the factors governing fertilization and cover-cropping in California.

754. CHRISTIANSEN, J. E. 631.67: 634/635  
Irrigation by sprinkling.  
*Bull. Calif. agric. Exp. Stat.* 670, 1942, pp. 124.

In discussing sprinkling as a method of irrigation for field crops and orchards, the author first describes the several types of sprinkler systems used. These include rotating sprinkler systems subdivided into stationary, semi-portable and portable types and oscillating nozzle lines. Orchard systems are further classified as to whether the water is distributed over the trees, or under the overhanging branches, the latter type being called under-tree systems. The bulletin deals primarily with portable field crop systems, which are now used more extensively than other types. Sprinkling is compared with other methods of irrigation, and the relative merits discussed. In general, sprinkling is satisfactory for most conditions, but it often costs more. The hydraulic and engineering features are dealt with in considerable detail. The results of several years of research in this field are included. Tables and diagrams are presented to aid in the design of efficient systems. The uniformity of distribution of water from sprinkler systems is discussed, and a number of illustrations are used to show the effect of various influences on the distribution of water. A table summarizes the results of 170 tests to determine the distribution patterns for various sprinklers. A logical procedure to be followed in the design of an efficient sprinkler system is presented and illustrated with examples. J.E.C.

755. PARTRIDGE, N. L. 634.1/2-1.874  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 25: 249-52.

A legume program for orchards on sandy soils.

A programme is worked out for growing legumes on sandy soils as a substitute for chemical nitrogen fertilizers in orchards. Sweet clover, mixtures of soybean and Sudan grass, rye and vetch, alsike clover and grass, and mulching with cuttings are dealt with.

756. UPSHALL, W. H., AND BRADT, O. A. 634.25-1.542  
Pruning methods for bearing peach trees.  
*Sci. Agric.*, 1943, 23: 257-64, bibl. 6.

A comparison of the relative merits of three peach pruning treatments. The trees were 5 years old at the start of the trials, which lasted 4 years and took place at Vineland Experiment Station, Ontario, and on Mr. F. E. Blackhall's farm at St. Catharines. Treatments: (1) the basic treatment consisted of removing all dead, dying and very weak wood and all drooping branches, (2) the same as (1) plus a heavy heading back of the extremities of all branches to a lateral arising from 2-year wood, (3) as (1) plus removal of about half the smaller laterals on 1-year wood. In the fifth year a few large, almost vertical, branches were removed from all treatments. Treatment (2) gave a tree from which a higher percentage of the crop but less fruit above No. 2 grade could be picked while standing on the ground. Trees under treatment (2) were definitely less spreading and tall but by the fifth year the growth of trees under treatments (1) and (3) was becoming weak and required heavier pruning and/or feeding to stimulate the development of longer and stronger terminal growths. The time taken in minutes for each treatment per tree per annum during the last two years of the experiment was for No. 2 58, No. 1 66 and No. 3 84. In monetary returns after deduction of cost of thinning and pruning there was an appreciable reduction

in returns from treatment (2) but no significant reduction between (1) and (3).

757. THOMPSON, C. R. 634.1/2-1.542  
Pruning of young trees for early crop production.  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 57-60.

Provided discrimination is exercised in the selection of principal shoots, commercially sound young trees can be produced quickly by the limitation of pruning to (1) the removal of crossing and rubbing shoots; (2) the shortening of shoots only where further young shoots are needed. The method advocated is in direct contrast to the usual practice of severely pruning each season, a practice which delays cropping and keeps the tree small for many years.

758. HORTICULTURAL EDUCATION ASSOCIATION FRUIT POLICY COMMITTEE. 631.542: 634.1/7  
Pruning established trees to improve yield and regularity of cropping.  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 60-2, being *Fruit Production Memo* 2, 1942.

759. MEURMAN, O. 634.11-1.542  
Omenapuukokeet Maatalouskoelaitoksen puutarhaosastolla I. Puiden leikkauskoe. (Trials with apple trees at the State Horticultural Research Institute, Finland. I. Pruning experiments.)  
*Valt. Maatalousk. Julk.* 1940, No. 7, from abstract *Nord. JordbrForskn.*, 1941, 23: 62-3.

The pruning experiment included 8 varieties of apples 4 grafted on wild stocks and 4 on Jaune de Metz dwarfing rootstocks. There were 1-3 pairs of trees of each variety or in all originally 40 trees. The object was to compare the results of drastic and light pruning. In the former case in the spring two-thirds of the annual leader growth was removed and the side shoots were spur-pruned to 2-4 buds. In the latter case one-third of the annual growth of the leaders was removed and the side shoots were only slightly shortened. The trees were pruned in this way during the first 6 years. Owing to injuries during the cold winter of 1939-40 the experiment had to be concluded in the autumn of 1940. Although it was thus of shorter duration than had been intended, the growth of the trees had made possible the deduction of definite conclusions. The results are illustrated by means of a number of tables.

In the majority of cases the more severe pruning has materially retarded and diminished the yield. This has been the case in particular with varieties in which fruitfulness happens fairly late, as in Sävstaholm and Åkerö. With the exception of Antonovka, Wealthy and White Transparent, a smaller crop has been obtained from the more severely pruned trees than from those more leniently pruned, if the whole 7-year yield-period be taken into account. The difference has, however, varied considerably depending on the difference in the time when fruitfulness occurs in the different varieties. The average weight of the apples has also been influenced by the pruning in that the fruits from the more severely pruned trees in all the varieties have been about 12% heavier on the average for the standard trees and 17% for the dwarf trees.

This experiment gives support to the generally held opinion that in climatically unfavourable regions with severe winters trees should be pruned more leniently than in countries better situated in this respect. Further, the experiment confirms the old rule that the different varieties react very differently to pruning, which must, therefore, be exactly adapted to the variety.

760. REBOUR, H. 631.542: 634.1/2  
Le contrôle de la taille par le propriétaire. (The control of pruning by the orchard proprietor.)  
*Fruits Primeurs*, 1943, 13: 1-3.

An essay on the general principles of pruning orchard fruits, with special reference to mistakes commonly made by untrained workmen in N. Africa.



761. MARSHALL, R. E. 631.542: 634.1/2

Let's take a look at pruning.

Rur. New Yorker, 1943, 102: 132, 142-3, bibl. 1.

Pruning experiments carried out at the Michigan Experiment Station are discussed. Gaston and Ricks of this station found that 49% of the total crop of apples came from the top of the tree and 15% from the inside. 63% of the apples from the top were more than 2½ inches in size and mostly fancy grade compared with 35% of this size on the inside, mostly commercial grade. Fruits from the outside were intermediate in grade and yield. A study of branch performance revealed that thick wood (branches whose 4-year-old wood exceeded ¾ in. diameter and made average annual terminal growth of 16 inches) yielded three times as many apples as thin wood (4-year wood less than ½ in. diameter, annual growth about 5 inches), bore apples half as large again, yielded four times the amount by weight and ten times as much fruit of U.S. No. 1 colour grade. A method of thin wood pruning has been devised for which numerous advantages are claimed, including reduced labour and the fact that it is practically fool-proof. All thin wood is removed from the tree. Much of it is found on large limbs growing in a horizontal or downward direction at the base of the tree. In such cases where removal of the wood would leave a too naked branch, the denuded large limb should be sawn off. None of the strong-growing wood is removed from the top of the tree even though the top may appear thick and the branches crowded and crossing. Pear, cherry and plum should be pruned lightly. Heavy pruning reduces yields without sufficient compensatory improvement in fruit quality. Any pruning should consist in removal of weak wood. Thick, sour cherry trees, however, respond to heavier pruning and fertilizer applications by heavier fruiting in subsequent years. These methods are unsuitable for peach trees. The pruning as of old should be fairly well distributed throughout the tree.

762. OVERLEY, F. L., AND OTHERS. 634.11  
Thinning out trees in an apple orchard.  
Proc. Wash. St. hort. Ass. 38th annu. Meet., 1942,  
1943, pp. 11-4.

There are many orchards in Washington where the trees are too tall and produce unnecessarily low grade fruit. How this could be remedied by thinning up to half of the established trees is shown. Better fruit will be produced at less cost, but it is unlikely that actual yield will again equal that of the orchard before thinning. One of the factors responsible for crowded orchards is that the grower has to show a certain crop production before getting satisfactory financing. Diagrams are given to illustrate problems in tree spacing and the best way to overcome them or to lay out new plants with a view to a future planned system of thinning.

763. HORTICULTURAL EDUCATION ASSOCIATION,  
EDITOR. 634.1/2-1.45  
The grubbing of fruit trees in wartime.  
Occas. Publ. sci. Hort. 4, 1943, pp. 77-80.  
Reasons, methods and costs.

764. SISLER, G., AND O'NEILL, W. J. 634.11: 634.993  
Preventing sprouts from developing on old apple  
trees.  
Bett. Fruit, 1943, 37: 10: 7.

Stumps of felled orchard trees if not removed from the ground will often send up shoots from the base which become a considerable nuisance. The stump may be killed and sprouting prevented if the soil is removed from round the crown to a depth of 2 inches and the stump sprayed with paraffin which is then ignited and will burn with an intense heat for a few minutes.

## Harvesting and marketing.

765. BATJER, L. P. 634.11-1.55: 577.15.04  
How are fruit drop sprays performing and what is  
the best way to use them?  
55th Trans. Peninsula hort. Soc. 1941, 1942,  
pp. 29-31.

Notes of results of spraying different apple varieties with hormone sprays to check harvest drop. Results were very good with Williams and with summer varieties generally. With Winesap, Stayman Winesap and Rome Beauty results have varied. With Delicious and McIntosh—which needs exact timing—they have been good, with York Imperial unsatisfactory.

766. KADOW, K. J., AND HOPPERSTEAD, S. L. 634.11-1.55: 577.15.04  
The compatibility of fruit drop chemicals.  
55th Trans. Peninsula hort. Soc. 1941, 1942,  
pp. 32-4, bibl. 5.

Studies were begun in 1940 to compare the compatibility of naphthaleneacetic acid and similar growth substance sprays with other spray materials. Studies on Williams and Delicious in 1941 showed that naphthaleneacetic acid is compatible with Black Leaf 155, Genecide, phenothiazine and derris (4 or 5% rotenone). There were indications, though not as yet proof, that these sprays did not affect the insecticidal properties of the insecticides. Sprays containing lime markedly reduce the effectiveness of fruit drop sprays when the lime is applied with or just before them.

767. SWARBRICK, T. 634.11-1.55: 577.15.04  
The influence of certain sprays on the pre-harvest  
drop of apples. Progress report II.  
A.R. Long Ashton Res. Stat. For 1942, 1943,  
pp. 29-31.

In 1942 trials spraying with both naphthaleneacetic acid and naphthoxyacetic acid at 0.001% concentration significantly reduced the pre-harvest drop in Allington Pippin, but did not affect it in King Edward VII apples. In the previous year the same King Edward trees had responded to treatment with naphthaleneacetic acid [*Ibidem* for 1941, p. 19; *H.A.*, 12: 810]. The suggestion is made that we may here be dealing with a residual effect. The trials do not provide a basis for practical recommendations to fruit growers.

768. EKSTROM, V. A. 634.25: 658.8  
Marketing the Illinois peach crop.  
Bull. Ill. agric. Exp. Stat. 492, 1942, pp. 46.

Illinois produces about 1,500,000 bushels of peaches a year, ranking eighth among the States. The bulk of the crop comes from orchards of 25 acres and more than 85-90% of Illinois peaches are of the Elberta variety. Lately, however, plantings of improved varieties have increased. Just over half of the crop is sold through agencies. The two most important types of cash buyers are merchant truckers and wholesale dealers. The transition from rail to truck shipment has created many marketing problems. In 1939 80% of the crop was moved by motor trucks and even in 1942 motor transport was the general rule in spite of the tyre shortage.

769. OLLIVIER, A. V. 634.1/8: 382.6  
Fruta Argentina para exportacion. (Argentinian  
export fruit.)  
Bol. Minist. Agric. B. Aires 36, 1939, pp. 40.

Notes are given of the districts in Argentina in which export fruit is produced and of the varieties of stone, pome and citrus fruits and of grapes and melons exported. The regulations governing this export are described. Details of packing the different fruits are noted. The dried fruit industry in certain provinces is also mentioned.



770. ZIPPELIUS, H. 634.1/8-1.513  
Die Bodenlockerung im Obstbau durch das Sprengverfahren. (Loosening the soil by blasting in fruit cultivation.)  
E. Ulmer, Stuttgart, *Grundlagen und Fortschritte im Garten- und Weinbau*, Heft 63, 1941, pp. 53, from review *Phytopath. Z.*, 1943, 14: 396.
- TRIBE, E. R. 634.1/8: 658.8  
El comercio de frutas Argentinas en el mercado de Nueva York. (Argentine fruit on the N. York market.)  
*Bol. Minist. Agric. B. Aires* 49, 1941, pp. 38.
- GAEBELER, A. A., AND PASTORIZA, R. 658.8: 634.8 + 634.22  
Estudio analítico de los precios obtenidos en Nueva York por las uvas y ciruelas Argentinas
- en la temporada de 1941. (Argentine grape and plum prices on the N. York market in the 1941 season.)  
*Bol. Minist. Agric. B. Aires* 51, 1941, pp. 34.
- TRIBE, E. R. 634.1/8: 658.8  
El comercio de frutas Argentinas en el mercado del Brasil. (Argentine fruit on the Brazilian market.)  
*Bol. Minist. Agric. B. Aires* 84, 1942, pp. 29.
- DIRECCION DE FRUTAS Y HORTALIZAS, ARGENTINA. 634.1/8  
Representacion grafica de la fruticultura Argentina. (Fruitgrowing in Argentina shown graphically.)  
*Bol. Minist. Agric. B. Aires* 85, 1942, pp. 34.  
Statistical data on fruitgrowing.

## SMALL FRUITS, VINES AND NUTS.

771. ULJANIŠEV, M. M. 634.7  
Michurin horticultural and small bush fruit field station at the town of Rossosh. [Russian.]  
*Plod. jagodn. Kultura*, 1940, No. 3, pp. 82-3.  
The author surveys briefly the history and activities of the station founded in 1937.
772. (EAST MALLING.) 634.711  
Raspberry conference at East Malling.  
*Gdnrs' Chron.*, 1943, 114: 26.  
A conference of growers was held at East Malling Research Station on 30 June 1943, to assist in selecting a number of seedling raspberries raised at the station by Mr. Grubb during the past 10 years. The fruit of all the seedlings was large and of good flavour and of a brighter colour than typical samples of Lloyd George, Norfolk Giant and Baumforth B. It was decided that at least four or five of the seedlings would be necessary to cover different seasonal and local requirements. Mr. R. V. Harris gave a survey of the diseases of raspberries in the course of which he showed how a succession of varieties has been introduced which have flourished for a time and finally gone down under virus diseases, Antwerp, Mitchell's Seedling and Lloyd George through mosaic 2 and Baumforth B and Norfolk Giant through the leaf-curl virus. At the moment the industry is left without a suitable variety and at this state the new seedlings may be able to fill the breach.
773. WILCOX, A. N., AND OTHERS. 634.75  
The Burgundy strawberry.  
*Minn. Hort.*, 1943, 71: 35-6, being *Pap. Minn. agric. Exp. Stat., misc. J. Ser.*, 480, undated.  
An account of the Burgundy strawberry (Easypicker × Duluth) developed at Minnesota University Fruit Breeding Farm as No. 1192 and now named and distributed. The qualities of this strawberry are its exceptional cold resistance, exceeding that of the leading commercial variety Premier, its seasonal lateness, unusually firm flesh and deep red colour. It is very suitable for canning and jamming and displayed on the market it usually sells first. In field trials Burgundy outyielded all commercial varieties. Its least desirable character is its habit of pistillate flowers which require the presence of cross pollinators before fruit can be set. The best pollinator and the maximum distances for interplanting them are not yet agreed upon. There is some susceptibility to leaf spot in moist situations but apparently not elsewhere. A technical description is given.
774. SCHUPHAN, W. 634.75: 581.192: 577.16  
Die Veränderung der Vitamin-C- und kalorischen Wertstoffgehalte bei deutschen Erdbeersorten unter dem Einfluss schönen und schlechten Wetters. (The effect of fine and bad weather on the changes of vitamin C and reserve material content in German strawberry varieties.)  
*Biochem. Z.*, 311 [sic], Heft 1-3, pp. 151-62, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 83.  
The ascorbic acid, sugar, and dry weight content of strawberries decreased after rain, the acid content increased. Reserve materials as calculated for dry weight had the same tendency to decrease. The Eva Macherauch variety was superior to all other tested varieties with reference to its biological value. The taste score (ratio sugar/acid + sugar content expressed in %) introduced as a test agreed with individual judgment.
775. SWARBRICK, T. 577.15.04: 635.64 + 634.75  
The effect of naphthalene-acetic acid and naphthoxy-acetic acid on fruit set and development of tomato and strawberry plants. Progress report.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 24-8.  
Spraying Plumpton King tomato plants in pots with 0.001% naphthaleneacetic acid and 0.001% naphthoxy-acetic acid [N-O-A] resulted in a check to their growth and development and marked epinasty on the parts touched by the spray. Ripening in Tardive de Leopold strawberry was delayed 21 days as the result of one spray application of 0.001% naphthaleneacetic acid at full flower. Epinasty of the petioles was marked. N-O-A greatly improved fruit set in the same variety and the increase in commercial crop was estimated at not less than a third. Many of the fruits were normal in shape despite their not having a full number of seeds. Less epinasty was noticeable. The addition of a spreader had no effect in either case. Possibilities are suggested for the use of these two compounds on such self-sterile or partially self-sterile varieties as Tardive de Leopold and Oberschlesien.
776. GREIG, A. M. W. 588.427  
Passion fruit culture.  
*N.Z. J. Agric.*, 1943, 66: 106-8, 167-70, bibl. 5.  
Commercial passion fruit cultivation in Auckland Province, N.Z., is on the decline largely owing to the incidence of disease. With careful cultivation the crop can still be made to pay and instructions as to the most suitable methods to employ are given. The prevalent diseases and pests are



described and preventives or remedies suggested. Among the many discussed, brown spot (*Alternaria passiflorae*) and bacterial grease spot (*Phytophthora passiflorae*) are the commonest and most deadly and for these bordeaux 3-4-50 should be sprayed on monthly from August to April. Among others mentioned are physiological root-rot prevailing on heavy clay soils with inadequate drainage, and woodiness, a virus disease which is aphid borne and probably also spread by contaminated secateurs and hands at pruning. Frequent washings of both in soapy water is advised and the removal and destruction of all infected vines.

777. WRIGHT, P. H. 634.72

A dry-land fruit—the buffaloberry.

Canad. Hort., 1943, 66: 79.

A note on the value of the buffaloberry (*Shepherdia argentea*) as a hardy and drought-resistant fruit native of Colorado and naturalized in parts of Canada. It responds well to cultivation but is seldom planted. The fruit makes an excellent and nutritious jelly.

778. JOHNSTON, S. 634.73-1.415

The influence of various soils on the growth and productivity of the highbush blueberry.

Quart. Bull. Mich. agric. Exp. Stat., 1942, 24: 307-10.

At the South Haven Experiment Station, East Lansing, blueberry plants were grown in the usual grey surface soil and in the white and reddish coloured soils normally found beneath it. A deep and uniform surface soil proved to be necessary for good development. Outcropping of the subsoils greatly reduces plant growth and yield. Further trials suggest that a soil pH value of under 5.2 is a more important factor for successful production than higher or lower clay content.

779. BRICHET, J. 634.37

La figue de Barbarie, source de produits alimentaires. (Products of the Barbary fig.)

Fruits Primeurs, 1942, 12: 191-5.

Products of the Barbary fig have been prepared and analysed by Professor Husson of the Institut agricole d'Algérie and his report with a brief introductory note by Brichet is reproduced. It covers dried fruit, juice extraction, the preparation of juice concentrates, the use of the marc and the production of alcohol.

780. PEARSE, H. L. 634.8-1.535: 577.15.04

The effect of nutrition and phytohormones on the rooting of vine cuttings.

Ann. Bot. Lond., 1943, 7: 123-32, bibl. 18.

The experiments were carried out at the Western Province Fruit Research Institute, Stellenbosch, S. Africa. Single bud cuttings of vines (Waltham Cross) grown under conditions of mineral starvation or semi-starvation and exhibiting symptoms of nitrogen starvation (a) bore pale green leaves and rooted readily; (b) improved in leaf size and colour and showed reduced root formation following the addition of  $\text{KNO}_3$  to the pure quartz sand rooting medium; (c) responded well to treatment with indolylbutyric acid by increase in number and length of roots; (d) showed a still greater response when  $\text{KNO}_3$  was added to the indolylbutyric acid treatment, leaf size and colour being also improved. Similar cuttings from vigorous plants grown under conditions of adequate or excessive nutrition (a) bore large green leaves and rooted poorly; (b) showed no response to  $\text{KNO}_3$ ; (c) showed no response to the indolylbutyric acid treatment; (d) showed no response except an increased mortality when potassium nitrate was added to the indolylbutyric acid treatment. It is concluded that nutritional conditions and method of culture of the parent plant are of importance in determining the ability of cuttings to root and to respond to treatment with plant hormones. When plants are growing under conditions which induce a relatively high proportion of root to shoot growth the tendency to form

roots becomes a property of such materials, for portions severed from them have the power of regenerating plentiful and quickly growing roots. A combined treatment with indolylbutyric acid and  $\text{KNO}_3$  greatly improved the rooting of cuttings of three varieties of vine rootstocks obtained from field material. [From author's summary.]

781. MERRILL, T. A. 634.84

The Eastern grape situation.

Rur. New Yorker, 1943, 102: 133.

In the course of a brief review of grape production in the Eastern States of U.S.A. domestic rye grass is mentioned as a satisfactory new cover crop for vineyards for preventing erosion, maintaining the organic matter content of the soil, acting as a storage for plant nutrients during winter and returning them to the soil when ploughed in during the following spring. It acts as a soil insulator during winter, thus protecting the roots from cold and helps to bring the vines to early maturity, lessening the risk of winter injury.

782. KACZMAREK, A., AND WEISE, R. 634.8-1.523

Physikalisch-chemische Untersuchungsmethoden für die Rebzuchtung. 1. Über das Absorptionsspektrum als Hilfsmittel bei der Rotwein-zuchtung. (Physical chemical methods of investigation for vine breeding. 1. The application of the absorption spectrum in breeding red wine grapes.)

Gartenbauwiss., 1941, 16: 314-57, from abstract Forschungsdienst, 1942, Vol. 14, abstr. p. 84.

The breeding of vine varieties which will give intensely dark coloured red wine being desirable, the authors studied the absorption spectra of grape juices with a gradation photometer. They found that colour graphs of grape juices could be obtained which were characteristic for each variety independent of origin or season. This would enable the breeder to select new varieties at an early stage. The theoretical foundations of the new method are discussed in detail and the practical application is described.

783. POTAPENKO, J. I. 634.8

The development of commercial viticulture in the Central Belt of European Russia. [Russian.]

Plod. jagodn. Kultury, 1940, No. 2, pp. 57-68.

IDEM.

Viticulture in the Central Belt of European Russia. [Russian.]

Sady i Ogorody, 1941, No. 6, pp. 16-23.

In the first paper the author discusses the biology of different varieties of vine in territories beyond the "Northern" limit of its habitat. The use of cold-resistant rootstocks such as "Buitur", "Kirinna", "Seedlings No. 45 and 46", and the Amur vine proved valuable. In the second paper the author deals mainly with cultivation problems in these territories. Deep planting, winter watering, covering up with earth or organic substances (straw, chaff, etc.), snow retention, use of wind-breaks, early spring fumigation, etc., are all discussed in turn and seem to have given good results.

784. THOMAS, J. E. 634.8-1.67 +1.415.3

An investigation of the problems of salt accumulation on a Mallee soil in the Murray Valley irrigation area.

Bull. Coun. sci. industr. Res. Aust. 128, 1939, pp. 88, bibl. 36.

The experiments were carried out at the Commonwealth Research Station, Merbein. After a soil, salt and vegetation survey had been made on an area of Mallee land in its original condition vines were planted and irrigated and the changes in soil salinity charted at regular intervals. Problems in connexion with excessive salinity such as development of salt after irrigation, the significance of a free water table, spray irrigation as the only efficient method of irrigation, drainage, and leaching are discussed.



785. DARLINGTON, H. C. 634.76  
Vegetation and substrate of cranberry glades, West Virginia.  
*Bot. Gaz.*, 1943, 104: 371-93, bibl. 12.

786. HOWARD, A. L. 634.51  
Walnut trees.  
*Nature*, 1943, 151: 705.

The importance of replanting the walnut tree in England, a practice pursued with vigour up to 100 years ago, is pointed out. The walnut tree should receive proper cultural treatment and protection from insects and animal predators, if it is to fruit profitably. Within the last 50 years many of the larger trees have been sold for the sake of the high prices obtained for the wood. *Juglans nigra*, the Virginian black walnut, praised and planted by John Evelyn, is not really suited to the English climate though it grows rapidly at first. The European variety, *J. regia*, on the other hand will thrive and in favourable circumstances will have grown to a height of 5 to 8 ft. with a girth of 4 to 5 in. at 2 ft. from the ground at 4 years of age. Experimental work at East Malling shows that the tree can be expected to bear its first fruits earlier in life than was formerly thought possible.

787. KRAMER, P. J. 581.14: 634.51  
Amount and duration of growth of various species of tree seedlings.  
*Plant Physiol.*, 1943, 18: 239-51, bibl. 20.

Growth measurements were made on 11 species of tree seedlings, among them the black walnut, *Juglans nigra* L., at Durham, North Carolina. It was found that the black walnut made about 50% of its growth by 1 May and ceased growth in July or early August after a growing season of 130-135 days. The shape of the growth curve of the trees under test seemed determined by genetical rather than environmental factors.

788. GAGNARD, J. 634.521-1.541.44  
Récoltons de bonnes et belles pacanes par le greffage des arbres de semis. (Topworking pecans.)  
*Fruits Primeurs*, 1942, 12: 213-4.

Pecans in Algeria are a heterogeneous collection all grown from seed and of little value save for their appearance. Some effort should be made to work these over to selected varieties. Even quite old trees can be crown grafted and will bear useful crops a few years later. To prepare the tree the main branches are headed back in January or February to within a metre or less of the trunk, one or two of the smaller ones being left untouched as nurse branches to be progressively removed as the grafts develop. The

headed trees are at once whitewashed against sunburn. The shortened branches are crown grafted in March. The operation is not described, but emphasis is laid on the importance of a complete exclusion of air from the union by thorough waxing. The grafts are covered with waxed paper bags to reduce evaporation. As a precaution against wind and parched buds the new grafts are protected by twiggy branches fixed on the stock branches. The scions should be selected from healthy, well-budded 2-year-old wood. Selected material can be got from the Boufariq experiment station.

789. HAUVILLE, A. 634.55  
Produisons des amandes. Créons l'amanderaie algérienne. (Commercial almond growing in Algeria should be greatly expanded.)  
*Fruits Primeurs*, 1942, 12: 152-3.

Barely sufficient almonds are produced in Algeria to supply local needs whereas Tunis and Morocco with no better soil or climate and more recently colonized export largely. The advantages to be gained by establishing an almond industry are enumerated. The almond is very hardy and resistant to extremes of temperature and to drought. It is suited by most soils including those which are poor and stony and is only really sensitive to clay or badly drained ground. Spring frosts may interfere with cropping and new plantations should be sited to avoid them. The correct method of propagation is to shield bud on wild almond seedlings (bitter or sweet), selecting as far as possible the stocks with the strongest root system. Spacing in the plantations depends on rainfall; a minimum of 8 m. apart where the rainfall approaches 400 mm. and 10 to 12 m. on dry hillsides is suggested. In rocky ground it pays to blast out planting holes and to fill them with good soil. The chief variety grown at present is *Princesse*, valuable in France but of poor fertility in Algeria. There are a number of good local varieties of unknown origin which are worth propagating. A list of suitable American and other varieties is given with notes on cross pollination. Californian varieties have the advantage of late flowering and consequently a good chance of escaping frost damage. Endeavour must be made to provide as much water as possible, thus interplanting with other crops is to be deprecated, the soil round the trees must be well broken up before the rains to catch run-off and in the early years furrows from the surrounding land should be led to the tree basins for the same purpose. Pruning in the early years is directed to obtaining a good framework. Pests and diseases are not serious. The tree may show a profit in the fifth year, is in full bearing from the twelfth to fifteenth year and begins to decline after the thirtieth year.

## PLANT PROTECTION OF DECIDUOUS FRUITS.

790. PIRONE, P. P. 635.976: 632.3/4  
Diseases of shrubs and small trees.  
*Proc. 16th nat. Shade Tree Conf.*, Detroit, 1940, pp. 91-112.

The common diseases of some American shrubs and small trees as well as measures for their control are described. Notes are given on the special conditions required by each plant. In conclusion it is stated that the practice of proper manuring, judicious pruning and timely spraying will keep shrubs and small trees healthy to the same extent as large trees.

791. ANON. 632.3/8  
Plant diseases and insect pests. Notes by the biological branch.  
*J. Dep. Agric. Vict.*, 1943, 41: 98-104.

Among notes on more common pests and diseases there is a report on the first appearance of raspberry mosaic in Victoria. So far, the disease is confined to the Kalorama and Silvan districts, attacking there chiefly the Everbearing

variety. Growers are advised to destroy infected plants and to discontinue growing this variety.

792. ANON. 632.3/4  
New plant diseases.

*Agric. Gaz. N.S.W.*, 1943, 54: 158.

During the six months ending December 1942 the following diseases among others were recorded for the first time in New South Wales: *Phytophthora* sp. on onion; *Pythium* sp. on beetroot; *Erysiphe polygoni*, *Olpidium brassicae* on swedes; *Phytophthora cryptogea* on tomato; spotted wilt virus on parsnip; *Pythium* sp. on French bean; *Phytophthora* sp. on sage; *Bacterium syringae* on lilac.

793. CIFERRI, R. 632.3/4 + 632.8  
Manuale di patologia vegetale. (Manual of phytopathology.)  
Genoa, Rome, Naples, 1941, pp. 730 from review *Phytopath. Z.*, 1943, 14: 390-3.

The manual is criticized for many shortcomings by the German reviewer, G. Gassner, his main objection being that the author had made too little use of foreign literature.



794. KOTTE, W. 634.1/7-2.3/8  
*Krankheiten und Schädlinge im Obstbau und ihre Bekämpfung. (Diseases and pests of fruit trees and their control.)*  
P. Parey, Berlin, 1941, pp. 296, RM. 16, from review *Phytopath. Z.*, 1943, 14: 393-4.  
The book is divided in five parts, of which part C dealing with diseases and pests and extending over 200 pages represents the nucleus. Part E contains a key for determining the most important diseases and pests.
795. HUSFELD, B. 631.521.6  
*Zur Züchtung krankheitswiderstandsfähiger Kulturpflanzen. (The breeding of disease and pest resistant economic plants.)*  
*Angew. Bot.*, 1943, 25: 115-25, bibl. 35.  
Discussing various aspects of the problem the author argues that the breeder of resistant varieties ought to aim at precluding all possible biotypes of a particular disease or pest which may arise.
796. JEFFERS, W. F., AND DARROW, G. M. 634.75-1.523: 632.8  
*Promising strawberry crosses resistant to the red stele disease [Phytophthora fragariae].*  
*55th Trans. Peninsula hort. Soc.* 1941, 1942, pp. 20-3.  
A brief discussion of the qualities of 5 strawberry hybrids (Aberdeen × Fairfax with one Aberdeen × Dorsett Cross) which show promise together with resistance to red stele disease.
797. BÖRNER, C., AND GOLLMECK, F. 634.11-2.753-1.521.6  
*Blutlausimmune Naumburger Edelapfelzüchtungen. (Naumburg apple seedlings immune to woolly aphid).\**  
*Angew. Bot.*, 1943, 25: 144-9.  
The authors report on many years' work of raising apple seedlings immune to woolly aphid at the Naumburg branch of the Biologische Reichsanstalt. After the criterion of immunity had been based on the necrosis reaction of the tissue to aphid puncture extensive crosses were made. 11 immune and 31 susceptible seedlings were obtained from crossing the Jaune de Metz apple with *Malus micromalus* and *Malus baccata*, and 41 immune and 356 susceptible seedlings from crosses of the above mentioned species with 2 hybrid free-flowering seedlings. These figures were explained by the effect of 2-3 recessive multiple necrosis genes M, analogous to the inheritance of *Phylloxera* immunity. It is noted that the ratio had necessarily to differ from previous East Malling counts, since the necrosis reaction as a criterion for immunity had not been introduced when the English figures were published. The necrosis reaction type was later discovered also in *Malus baccata*, *M. coronaria*, *M. orthocarpa* and *M. pumila* as well as in Northern Spy, Ontario, and Harbert's Reinette. In 1942 three fruiting seedlings of the family No. 8 (Baumann's Reinette × Ontario) were found to be immune to woolly aphid. In view of the fact that only these three seedlings were left and as the result of other observations the authors believe that a high proportion of the progeny from Ontario hybrids may have inherited immunity from that parent. The seedling No. 8-17 is particularly interesting because its apples combine resemblance to Ontario with apparently good storing properties. It is considered probable that unfavourable growing conditions and the youth of the tree account for the comparatively small size of the fruit. The seedling is not frost hardy. In conclusion the authors suggest that large-scale crosses with Ontario and Northern Spy as one parent should be carried out in order to produce seedlings for the selection of first-class varieties immune to woolly aphid. Immune rootstocks should be raised in the same way.
- \* Full translation available at Bureau.
798. BÖRNER, C. 634.8-1.521.6  
*Die ersten reblausimmunen Rebenkreuzungen. (The first phylloxera-immune vine hybrids.)*  
*Angew. Bot.*, 1943, 25: 126-43.  
Both root and leaf of a male specimen of the N. American sweet winter vine, *Vitis cinerea* Engelm., from the Arnold Arboretum of the Harvard University, proved completely immune to *Phylloxera* in investigations conducted at the Naumburg branch of the Biologische Reichsanstalt. The late flowering of Cinerea Arnold, as the author calls this vine, made forcing in February necessary if pollen was to be obtained at the right time. In 1936 numerous crosses were carried out with varieties of *Vitis vinifera*, *Vitis vulpina* (riparia) and 4 hybrids. F<sub>3</sub> seedlings combined immunity to *Phylloxera* with such other desirable characteristics as good rooting capacity of cuttings, satisfactory maturing of the wood, and frost hardiness. Scion compatibility and other important properties remain to be tested.
799. WALLACE, T. 632.19: 635 + 634  
*Mineral deficiencies in vegetable and fruit crops and visual methods of diagnosis.*  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 38-41, bibl. 2.  
Symptoms of potassium, magnesium, manganese and boron deficiencies in various fruit and vegetable plants are briefly described in such a manner as to render the visual method of practical use for a quick diagnosis in the field. Soil deficiencies can be diagnosed by indicator plots and a list of indicator plants which best show the respective deficiencies is given.
800. ROACH, W. A. 581.111: 632.19  
*The diagnosis of mineral deficiency by plant analysis and plant injection.*  
*Occas. Publ. sci. Hort.* 4, 1943, pp. 40-1.  
An outline is given of the technique, especially of plant injection, developed by the author.
801. DODGE, A. W. 581.111: 635.9: 632.3/4  
*Practical aspects of tree injection for disease control.*  
*Combined Proc. 18th nat. Shade Tree Conf. Chicago*, 1942, pp. 154-63.  
Experiments on treatment with injections of bleeding canker, caused by *Phytophthora cactorum*, were carried out at the Bartlett Tree Research Laboratories, Cambridge, Mass. After a suitable technique had been developed injections of several hundred trees with Carosel, a proprietary compound of di-amino-azo-benzene, resulted in the recovery of 92% of the injected trees. Under recovery is understood the failure to re-isolate the fungus. Later on the method was introduced into commercial practice. Among the detailed instructions for the application of the technique are the following points: A stainless steel trough has been used, 5 in. long, 2 in. deep, closed at one end and finished with two prongs on the upper edge of the open end, which hold the trough closely to the tree. Pint bottles of the diluted solution are placed at intervals of 8-10 in. apart around the trunk, about 2 ft. above the ground. Injection holes must not be drilled in necrotic areas. Bottles fastened on growth ridges may be emptied in 20-40 min., but it will take some hours before bottles in depressed areas are emptied. An injection bit must have cutting edges. 3-4 in. is the maximum depth of a hole which should open the water-conducting elements of the wood to the chemical, but not extend into the heartwood. Drilling is best done under liquid. A table giving data of twig growth of treated and untreated diseased trees, based on over 10,000 injections, makes it clear that the tree responds favourably to treatment. Besides increased twig growth larger and greener foliage and increased bud size were observed.

802. HORSFALL, J. G., AND ZENTMYER, G. A. 581.111: 634.1/9-2.19

**Chemotherapy for vascular diseases of trees.**

*Proc. 17th nat. Shade Tree Conf. Washington, D.C., 1941, pp. 7-18, bibl. 7.*

Pathologists working on vascular diseases are engaged in a search for the selective toxicant that will kill the fungus without affecting the tree. So long as this problem remains unsolved antidoting the poison released by the fungus seems a promising solution, as Howard's injections of orange helione (di-hydrochloride of di-amino-benzene) against bleeding canker of maple demonstrate. Research carried out at the Connecticut Agricultural Experiment Station, New Haven, suggests that Dutch elm disease is caused by sewage products of the fungus living in the vascular bundles of the tree. Elm shoots will wilt when placed in extracts from cultures where *Graphium ulmi* was growing. The hypothesis of toxication by *Verticillium* is supported by the fact that symptoms are observed in the top when the fungus has penetrated the tree from the root no further than the trunk. Numerous *Verticillium* infected eggplants have shown improvement upon injection of helione, oxyquinoline sulphate and urea. Before a more definite opinion on the new chemotherapy can be formed large-scale injection trials are necessary since a number of trees tend to recover in any case from the fungus attack. The recovery of the tree and not the possibility of reisolating the organism should be regarded as a criterion of recovery, for trees can be mere carriers of disease without being affected themselves.

803. WALLACE, T., AND JONES, J. O. 634.1/2-2.19: 546.711

**The control of manganese deficiency in fruit trees.**

*A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 18-23, bibl. 1.*

Experiments on the control of chlorosis of fruit trees due to manganese deficiency were carried out at two centres in 1942. Solid injections of manganese sulphate by Bennett's method and spraying with manganese sulphate effectively controlled the chlorosis without damaging the plum and apple trees concerned. Sulphur applied as a fertilizer controlled manganese deficiency in globe beet growing between the trees on the sulphur fertilized plot. The following treatments had no effect on manganese deficiency in apple trees: Spraying with ferrous sulphate and copper sulphate at petal fall and later; solid injections of ferric citrate; fertilizer applications of manganese sulphate and sulphur. Results suggest that commercial control of manganese deficiency in apple trees will be readily obtainable by the addition of manganese sulphate (3 lb. to 100 gal.) to the usual petal fall lime-sulphur spray.

804. BRICHET, J. 632.191: 634.1/7  
La chlorose des arbres fruitiers à feuilles caduques.

**(Chlorosis of deciduous fruit trees.)**

*Fruits Primeurs, 1943, 13: 12-5.*

Lime-induced chlorosis is widespread in N. Africa among fruit and other trees of commercial importance. The author explains the nature of the malady and gives a comprehensive account of various methods of treating it, based chiefly on American work.

805. MALÁČ, V. 634.8-2.191  
Ursachen der Chlorose an der Weinrebe.

**(Causes of chlorosis of the vine.)**

*Weinland, 1941, 13: 88, from abstract Forschungsdiest, 1942, Vol. 14, abstr. p. 77.*

The chief cause of chlorosis of the vine is a too small Mg. content in the soil in proportion to Ca. Where the MgO: CaO ratio is 1:6-12, instead of 1:3, commercial fertilizers giving an acid reaction should be applied. Stocks should be used which are resistant to chlorosis and at the same time tolerate a fairly light lime content of the soil. Acid soils require lime, magnesium, phosphate, and nitrogenous fertilizers.

806. HILDEBRAND, E. M. 634.25-2.8

**Peach-suture spot.**

*Phytopathology, 1943, 33: 167-8, bibl. 1.*

A new peach disease affecting exclusively the suture region is described from Lake Ontario district of Wayne County, N.Y. It is peculiarly a harvest time disease, affecting individual trees distributed irregularly throughout the orchard. The true cause is unknown.

807. PARTRIDGE, N. L. 634.1/2-2.111  
Extent of injury to fruit trees during the winter of 1941-42 and what can be done about it.  
*Quart. Bull. Mich. agric. Exp. Stat., 1943, 25: 255-63.*

Although it is not yet known in detail what weather conditions are responsible for frost damage it is likely that the mild autumn and early winter of 1941 in conjunction with heavy rain in September and October were outstanding causes of the frost injuries in south-western Michigan. Peach flower buds were killed at  $-12^{\circ}$  F. while trunk injuries occurred at  $-8^{\circ}$  F. where the wood was not well matured. It is found that a vigorous autumn cover crop will check growth of the trees late in the season and thus reduce damage to immature wood. Blackhearting of peach trees was observed wherever the temperature fell as low as  $-12^{\circ}$  F. Serious injury was confined to trees making weak growth on dry or infertile soils. Since, generally, trees with moderately vigorous growth suffered least, soils should be chosen or managed to induce such growth.

808. OSTERWALDER, A. 634.1/7-2.111  
Bei welcher Temperatur erfrieren die Obstblüten?  
(At what temperatures are fruit blossoms killed by frost?)  
*Schweiz. Z. Obst- u. Weinb., 1943, 52: 324-31.*

The effect of frost on fruit blossoms was studied by exposing flowering branches of cherries, apples and pears to different temperatures in a cold chamber and transferring them into a shady room or sunlight after different spells of exposure. In all cases the female organs, particularly the bottom part of the style, were most susceptible to frost. When cherry branches were kept in the chamber for 2 hours a number of styles were killed by frost whilst other parts of the flower and the leaves suffered no significant damage. After 2 hours at  $-3$  to  $-3.3^{\circ}$  C. all the styles were dead, but temperatures of  $-1.1$  to  $-1.9^{\circ}$  C. sustained for  $14\frac{1}{2}$  hours did not injure the plants appreciably. Apple blossoms reacted in much the same way as cherries, but pears were found to be slightly more resistant. In all experiments wet branches suffered more severely than dry ones. Syringing the branches after they had been removed from the cold chamber did not mitigate the damage, as often believed, but made it worse. Sunshine after frost was not harmful, as many growers think, but beneficial. Young 15 cm. high tomato plants in pots suffered no frost injury from a 1-hour's exposure to  $-3^{\circ}$  C. provided they were kept dry; comparable plants watered after the frost were killed.

809. VON BREMEN, W. 634.1/2-2.111  
Über die Winterhärte von Obstsorten. (Winter hardiness of fruit varieties.)  
*Dtsch. Obstb., 1942, Heft 1, p. 17, from abstract Forschungsdienst, 1942, Vol. 14, abstr. p. 83.*

A survey of the fruit trees in the Wartehagau of Eastern Germany during 1940 and 1941 gave the following results: Winter hardy apple varieties: Wealthy (N. America), Säfstaholm (Sweden), Antonovka, Titovka, Litauer Pepping, Weisser Klarapfel (Eastern Europe). Insignificantly injured by frost: Signe Tillish (Denmark), Red and White Astrachan, Kostella (Eastern Europe), McIntosh (N. America), Ackerö (Sweden), Bohnapfel, Roter Eiserafel, Purple Cousinot and Graf Nostiz. Severely injured or killed: the American varieties Ontario, Baldwin, and in some cases Jonathan, all Calville varieties, all pearmain, all middle



and west European pippin varieties, Baumanns, Kasseler, Cox's Orange, and Landsberger Reinette, Belle de Boskoop and Grahams Jubiläumsapfel. All pear and sweet cherry varieties were killed or severely injured. With the exception of Englische Frühzwetsche, damson, plum, and greengage varieties grown in the Warthegau suffered more or less badly from the frost. Damage to the flowers of sweet cherries (Grosse lange Lotkirsche, Minister v. Podbielski, Gubens Ehre, etc.) was generally slight.

810. ROGERS, W. S. 634.75-2.111

**Strawberries, straw and frost.**

*Fruitgrower*, 1943, 95: 393-4, bibl. 2.

A series of experiments at East Malling Research Station show that a layer of straw on the ground, such as it is customary to place round strawberries, has the effect of insulating the heat radiation from the ground to an extent that under certain conditions when the plants are in bloom may make all the difference between frost damage and no damage. The thickness of the layer of straw makes no difference to degree of insulation. In conditions roughly comparable to those of strawberry flowers exposed to the sky the average minimum temperature recorded above bare ground was 7° F. higher and that below the straw 13.3° higher than that above the straw. In conditions comparable to strawberry flowers shielded from the sky by leaves the temperature recorded on bare soil only 3 ft. away averaged 4° higher and the temperature under the straw 12.8° higher than that above the straw.

811. WALTERS, D. V., AND SPICER, R. W.

634.873-2.111

**Attempted frost protection of sultana vines with a petroleum spray.**

*J. Aust. Inst. agric. Sci.*, 1943, 9: 31-3.

In a series of trials carried out at the Commonwealth Research Station, Merbein, and by S. Australia and N.S.W. Departments of Agriculture up to 11 days delay in budburst (as a means of frost protection) was obtained by spraying dormant vines with a common summer spraying oil (viscosity 60-70 R.1 at 100° F.). Length of delay increases with concentration of oil up to 40%. Time of application seems dependent on the season. In a dry season similar results were obtained with sprays applied 8, 5 and 2 weeks before budburst, but in a wet season with rains between sprayings the intermediate application gave the greatest delay. Almost equal effect was obtained whether the buds only were painted, the canes alone sprayed or a prolonged spraying given to the whole vine, canes, crown and butt. The treated vines are normal by harvest, though there is marked delay in growth compared with untreated vines [well shown in a photograph]. Reduction in fruit yield and vigour have not been significant. Following two severe frosts in 1941, 14% untreated buds were killed and on vines sprayed with 5% and 15% oil, 7% and 1.2% respectively.

812. REEVES, E. L. 634.1/7-2.8

**Virus diseases of fruit trees in Washington.**

COE, D. M. 634.2-2.8

**Report of the 1942 stone fruit virus disease survey of Washington.**

*Bull. Wash. St. Dep. Agric.* 1 and 2, 1943, pp. 25, bibl. 27, and pp. 20, bound in *Proc. Wash. St. hort. Ass. 38th annu. Meet.* 1942, 1943.

The bulletins are the result of a survey by the Division of Horticulture, Washington, of the peach and cherry orchards in the principal fruitgrowing districts of the State. The purpose was to obtain data relative to the distribution of, and commercial and economic losses from, virus diseases of stone fruits with the object of laying the basis for intelligent control measures. The first bulletin describes the symptoms and evaluates the problems presented by each disease including one each of apple and pear. The second

deals specifically with the results of the survey. A number of coloured plates give excellent representations of the leaf and fruit symptoms.

813. (HARRIS, R. V., BRYCE, A. D., AND FOISTER, C. E.) 634.711-2.8

**Raspberry leaf curl.**

*Fruitgrower*, 1943, 96: 51.

A joint statement on the new, provisionally named raspberry leaf curl disease of Norfolk Giant raspberry has been issued by those working on it at East Malling Research Station, the East of Scotland College of Agriculture and the Department of Agriculture for Scotland and is reproduced. The disease is characterized by a pronounced downward curling of the leaves starting at the top of the cane and extending progressively to the older leaves until all but the oldest basal leaves are tightly curled. The leaves become dark green, often with a waxy appearance and the stalks seem translucent. Both leaves and stems become extremely brittle. Both young canes and fruit laterals are also affected, the leaves on the latter assuming a yellow mottling reminiscent of mosaic disease. Affected stools die within a year. Grafting experiments, of which a brief outline is given, identify the disease as the infectious virus disease known as Baumforth's disease which destroyed this variety in Scotland some 15 years ago and closely resembles North American leaf curl. There is more than a possibility that Lloyd George is a masked carrier of this virus and immediate precautionary methods based on this assumption are recommended such as isolation of Norfolk Giant from the neighbourhood of the variety, especially from stock propagated in Scotland. Other precautions advised are the removal and burning of any diseased or suspected Norfolk Giant stools, and the planting of new stock from disease-free sources only.

814. ZELLER, S. M., AND BRAUN, A. J. 634.711-2.8

**Decline disease of raspberry.**

*Phytopathology*, 1943, 33: 156-61.

A decline disease of raspberries has caused injury to large areas of commercial plantings in Western Oregon. The only visible symptoms are a gradual dwindling in vigour of canes and roots and some late autumn leaf rolling. The disease can be transmitted by grafting. No insect vector has yet been found. The names proposed for this virus disease are, decline disease of raspberry, *Minuor ruborum* as a binomial and *Rubus virus 8* as the numerical designation

815. HEWITT, W. B., AND OTHERS. 634.8-2.8

**Pierce's disease of grapevines.**

*Circ. Calif. agric. Exp. Stat.* 353, 1942, pp. 1-32.

Pierce's disease of grapevines, which has been described under other names, including the California vine disease and Anaheim disease, occurred in California in the 1880's and at that time was responsible for the destruction of some 35,000 acres of vineyards. Pierce's disease has recently been found in nearly all grape growing sections of the State. It is spreading rapidly in many sections and has become epidemic in the central San Joaquin Valley, completely destroying some vineyards. The disease is caused by a virus experimentally transmissible by grafting and in the field by at least three species of leaf hopper vectors, *Draculacephala minerva* Ball., *Carneocephala fulgida* Nott., and *Sibovia circellata* (Baker). Typical symptoms are: delayed foliation; leaf mottling, burning, and scalding; dwarfing of the vine; wilting and drying of the fruit; failure of canes to mature evenly; and finally death of the vine. Grape varieties showing typical symptoms are listed, and those varieties which show atypical symptoms are listed separately with their symptoms. Many vineyards have thus far been kept in good production by roguing and replanting. The replanting may be done by layering, approach-grafting to newly planted phylloxera- or nematode-resistant rootstocks, and by planting rootings or bench grafts. Pierce's disease

may be confused with the disease little leaf, caused by zinc deficiency and characterized by small leaves which develop varying degrees of chlorosis, asymmetry, and attenuation of the petiole sinus; it may also be confused with black measles, cause undetermined, which is characterized by spotting, cracking, withering, and drying up of the fruit; by veinlet clearing, spotting, burning, and dropping of leaves; and by the new growth which usually develops after affected leaves of measles vines fall. W.B.H.

816. COOLEY, J. S., AND LINCOLN, F. B.

634.11-1.541-2.48

A disease of apple grafts and layers caused by a *Rhizoctonia*.

Phytopathology, 1943, 33: 255-7.

At the Agricultural Experiment Station, College Park, Maryland, the tender underground portions of apple grafts and to a less extent also young apple layers, were found to die after an attack of a disease of the damping-off type. The fungus isolated from the tissue of active lesions was a *Rhizoctonia* species, which infection experiments proved to be the cause of the disease.

817. JAHN, E.

634.11-2.42

Untersuchungen zur Vorherbestimmung des ersten Spritztermines beim Apfelschorf. (Pre-determination of the first spraying date against apple scab.)

Angew. Bot., 1943, 25: 55-78, bibl. 18.

The author's investigations, which were carried out at the Biologische Reichsanstalt, Berlin, confirmed Holz's results on the predetermination of the first spraying date against apple scab. In all tests the main dispersal of fungus spores in the open occurred a few days later than the corresponding dispersal in the laboratory. Among detailed descriptions of methods for catching the spores are the following points: Leaves containing perithecia should be moistened only for a short while since the dispersal of spores starts within the first minutes. The maximum dispersal occurred during the first 30 minutes. It was, therefore, sufficient to expose the slides to the leaves for 2 hours, dry leaves requiring a longer time. The optimum distance between slide and leaf in the spore traps was 3 mm. When a slide previously prepared with vaseline was put over the leaf at that distance 5 transverse rows of an area of 18 x 18 mm. had to be counted. After discussing Holz's temperature sum total rule the author gives his own results for Berlin. There, during 3 successive years, the temperature sum total was 140° C. At constant temperatures between 2° and 20° C. the perithecia developed according to this rule provided they contained at least young primordia when the experiment started.

818. CATION, D., BOYER, C. A., AND ROBERTSON, C. W.

634.7-2.411

Red stele root rot of strawberries. Serious new disease curtails strawberry production.

Quart. Bull. Mich. agric. Exp. Stat., 1943, 25: 235-42.

The effect on the plant of the red stele root rot is described. The disease, which has begun to assume epidemic proportions in Michigan, is caused by the fungus *Phytophthora fragariae*. Until resistant varieties are on the market, the planting of disease-free stock on disease-free soil is the only control measure. A new system of inspection which will allow certification for apparent freedom from red stele will be offered by the State Department of Agriculture.

819. KEITT, G. W., AND MOORE, J. D.

634.23-2.4

Some results from experiments on cherry leaf spot control in 1942.

Wis. Hort., 1943, 33: 175.

Cherry leaf spot development was severe in Wisconsin and elsewhere. The following results from experiments in control were obtained. Three spray programmes comprised

application at petal fall, about 2 weeks later and just after harvest. Four-spray programmes included an additional application 4 weeks after petal fall. Lead arsenate 1½-100 was added to all first and second applications. Bordeaux 6-8-100 in 3-spray and 3-4-100 in 4-spray was satisfactory. 4-spray Tennessee copper 34+lime 3-3-100+Orthex 1-800 was less efficient. Bordeaux 1½-2-100, Basicop+lime 3-8-100 and lime-sulphur, all 4-spray, were unsatisfactory. A good control with slightly larger fruit than that following the best bordeaux programme was given by 4-spray Fermate, a commercial preparation of ferric dimethyldithiocarbamate 1½-100+lime 1½-100 in all preharvest treatments. In the 3-spray bordeaux programmes high magnesium lime gave rather better results than high calcium lime.

820. DRUMMOND, O. A.

634.37-2.48

Seca dos galhos da figueira. (Fig canker.)

Ceres, 1941, 3: 162-4, bibl. 2.

A description of fig canker, *Phomopsis cinerascens*, a disease attacking the stems of figs in Caldas, Sul de Minas, Brazil. This is the first time the malady has been reported from America. The remedy suggested is a rigorous pruning of the afflicted plants as soon as the disease is detected, the pruning cuts to be painted with bordeaux paste, followed by a bordeaux spray 15 to 20 days later to deal with any conidia which may have been dispersed before pruning. As the disease is a new one the Division of Plant Diseases or the School of Agriculture should be notified in order that they may "take necessary measures to prevent its spread".

821. ZELLER, S. M., AND BRAUN, A. J.

634.715-2.4

Stamen blight of blackberries.

Phytopathology, 1943, 33: 136-43, bibl. 5.

A disease of the anthers of blackberry flowers is described from the Oregon Experiment Station of which the causal organism is *Haplospheeria deformans*. Infection takes place through the axillary buds between March and May. Partial control was obtained with lime-sulphur applied in August but not when it or bordeaux were applied as a dormant spray.

822. HAHN, G. G.

634.722-2.452

Blister rust [*Cronartium ribicola*] relations of cultivated species of red currants.

Phytopathology, 1943, 33: 341-53, bibl. 18.

Blister-rust relations of cultivated red currants belonging to the species *Ribes petraeum* Wulf., *R. rubrum* L., *R. sativum*, and *R. sativum* var. *macrocarpum* Bailey are discussed and the literature is reviewed. Greenhouse experiments proved Red Dutch and Viking of the *R. petraeum* group to be immune to *Cronartium ribicola*.

823. NOLL, A.

632.452

Über den Nachweis von Rostmyzel im Gewebe der Wirtspflanze. (Demonstration of rust mycelium in the tissue of the host plant.)

Angew. Bot., 1943, 25: 24-8, bibl. 3.

The author simplified Holz's method for the demonstration of rust and other fungus mycelium in the host tissue. The material is boiled in 50% KOH for 10 minutes and then stained in a solution of aniline blue or acid fuchsin in acetic acid for 20 minutes. The preparation is then rinsed in tap water and examined in water. Material of a resistant host should receive preliminary treatment by being put for several hours into 50% HCl to which a piece of potassium chloride is added.

824. DRECHSLER, C.

632.41:633/635

Two species of *Pythium* occurring in Southern States.

Phytopathology, 1943, 33: 261-99, bibl. 35.

The two species, which attack horticultural and other plants are *Pythium myriotylum* and *P. oostrocodes*.



825. BRICHET, J. 631.651.3:634/635  
Anguillules, nematodes, hétrérodées, Parasites dangereux dont l'extension menace les cultures fruitières et maraîchères. (Eelworms or nematodes: parasites dangerous to fruit and market garden crops.)  
*Fruits Primeurs*, 1943, 13: 68-72.

The danger arising from a spread of nematode infestation in North Africa is pointed out. A note is given of the various kinds of nematode and a list of the horticultural plants principally attacked. The remainder of the article gives a comprehensive account of the various control measures which have been adopted or tried, principally in U.S.A.

826. SMITH, L. M., and CURTIS, A. F. 634.22-2.753  
New materials for control of the mealy plum aphid.  
*Bull. Calif. agric. Exp. Stat.* 671, 1942, pp. 1-30.

This study pertains exclusively to winter sprays, applied when the trees are fully dormant, for the control of the mealy plum aphid, *Hyalopteris pruni*, which is present on the trees during the winter, in the egg stage. Observations on scale control and effect on cover crop are included. The sprays included a number of dinitro compounds used in different ways.

827. SINGH, R. N. 632.753  
Control of the woolly aphid (*Eriosoma lanigerum* Hausmann) by spraying and other methods.  
*Indian J. agric. Sci.*, 1942, 12: 588-602, bibl. 6.

The most effective of all summer sprays, tested in the Kumaun hills, was soft-soap-nicotine. This combination of a contact insecticide and a fumigant gave complete control over the pest if thoroughly applied. The evaporation of nicotine sulphate being too slow in winter, rosin-soap spray was used in that season as the most effective contact insecticide. There were indications that the underground part of the tree may be protected by planting aphid-resistant stocks. For the greater part of the summer ladybirds help to keep the pest under control. *Aphis mali*, recently introduced into India as a parasite, could be made to take the ladybird's place in late summer and autumn if bred in cages during the rest of the year.

828. MILLER, L. W. 634.13-2.78  
Codling moth in Williams' Pears.  
*J. Dep. Agric. Vict. Austr.*, 1943, 41: 39-46 and 141-8, bibl. 15.

The life history of the codling moth (*C. pomonella*) was thoroughly studied in the laboratory. In the Goulburn Valley district of Victoria, hessian bands trapped more larvae than chemically-treated corrugated cardboard owing to the closer fitting of the first. It was found of paramount importance to apply the first spray at petal fall and not later. Two cover sprays against the first brood should be given later so as to coincide with the egg-laying periods. Correct timing of the spray applications by using temperature and humidity data would appear practicable, if suitable weather stations were established. The most economically efficient strength of lead arsenate was found to be 5 lb. of paste or 2½ lb. of powder to 80 gallons of water. The addition of nicotine sulphate or spraying with white oil emulsion did not improve the results. However, a mixture of 4 pints of white oil emulsion and 80 gallons of lead arsenate was superior to any other spray tested.

829. HAMILTON, D. W. 634.11-2.78-2.77  
Recent tests with some of the newer insecticides for codling moth control.  
*Proc. N. York St. hort. Soc. 88th annu. Meet.* 1943, 1943, pp. 152-8.

Recent tests at the Hudson Valley Fruit Investigations Laboratory, Poughkeepsie, N.Y., indicate that certain nicotine combinations as well as xanthone and phenothiazine show promise as substitutes for lead arsenate in the control of codling moth. A processed nicotine bentonite

containing 14% of nicotine used in combination with mineral oil proved in general the best nicotine combination. The best codling control was obtained by using xanthone in combination with lead arsenate. Phenothiazine was highly toxic to the codling moth but left an excessive residue on the fruit. Nicotine combinations and xanthone did not effectively control apple maggot (*Rhagoletis pomonella*), whereas phenothiazine effectively controlled both maggot and codling moth.

830. O'NEILL, W. J. 632.78  
A practical demonstration of codling moth control.  
*Proc. Wash. St. hort. Ass. 38th annu. Meet.* 1941, 1942, pp. 27-32.

The results of a spray programme described in this paper indicate that codling moth in U.S.A. may be successfully controlled by the use of a reduced number of spray applications, and of relatively simple spray materials, by taking advantage of the benefits resulting from well timed ovicidal sprays together with recommended accessory measures.

831. LINDBLOM, A. 634.11-2.78  
Rönnsbärsmalen år 1941. (Mountain ash and the incidence of the apple fruit miner in 1941.)  
*Växtskyddsmotiser*, 1942, Nr. 1, pp. 1-6.

During the past 15 years investigations have been conducted each year in Sweden first by the Central Institute for Agricultural Research and later by the State Plant Protection Institute on the risk of attack on apples by the apple fruit miner.

As the mountain ash is the natural host of this pest, apples are only attacked when rowan berries are lacking. Good results in controlling the pest have been obtained by spraying the unripe apples at the right time, that is, about 30 days after the insects have begun hatching out, giving 1 to 3 applications at intervals of 10 days of a spray containing nicotine, during years when rowan berries are lacking or scarce.

In the investigations conducted in 1941 it was found that very few insects hatched out from the samples of rowan berries sent in. As a result of the rowan berries having fallen from the trees before egg-laying had begun, the eggs were laid instead on the unripe apples: serious damage was caused in some orchards in different parts of the country. As far as is known the only other plants of any significance as host-plants are the white beam and crab apple. In future investigations they should be taken into account in frequency determinations.

832. AHLBERG, O. 634.22-2.78  
Fortsatta besprutningsförsök mot plommonvecklaren. (Continued spraying experiments to control plum tortrix.)  
*Växtskyddsmotiser*, 1941, No. 5, pp. 65-6.

In *Växtskyddsmotiser* 1939 (p. 73) some preliminary spraying experiments to control plum tortrix were referred to, which appeared to confirm the experience of Bovey in Switzerland that the best results are obtained by using nicotine. Egg laying was presumed to take place during the third-fifth weeks after flowering. Results of continued spraying trials during 1940 and 1941 at the same place—Riksåtra—agree on the whole with the results of these first trials. In 1940, however, egg laying had probably begun during the second week after flowering, which during all three years took place at the turn of the month May-June. In 1941 egg laying appears to have begun comparatively late—about 1 July, that is about four weeks after flowering, and to have been completed as soon as 11 or 12 July. In that year the eggs hatched out after 3-4 days, due to the very hot weather. Normally they hatch out after 7-8 days. In 1940 sprayings were carried out on 21 and 26 June and also on 1 and 11 July with 0.2% nicotine. On the unsprayed trees 13-14% of the unripe fruits were damaged, while on the trees which had been sprayed on 1-2 occasions 3-5% and on the trees

sprayed 3-4 times only 1-2% of the unripe fruits were damaged. The spraying carried out on 1 July, that is a month after flowering, probably gave the best result. Sprays in 1941 were more extensive and gave therefore more reliable results. They were carried out on 26 and 30 June and also on 4, 8 and 14 July with 0.2% nicotine. During inspection at the end of August on the average 15% of the unripe fruits on the unsprayed trees were found to be attacked. Where spraying was done only once, that on 26 June resulted in 13% attacked unripe fruits, on 30 June 9%, on 4 and 8 July 8%, and on 14 July 12%. The lowest percentage of attack—5%—occurred on trees which had been sprayed four times (26 and 30 June and also 4 and 8 July). A spraying liquid of 0.2% nicotine with an admixture of soap (or some suitable substitute) is the most effective. As, however, nicotine has a harmful effect on some varieties of plum a substitute for it must be sought or some admixture must be tested out which will not weaken its effect on the pest but which will make it less dangerous to the tree.

833. COOK, W. H., AND HALFERDAHL, A. C.

632.954

**Chemical weedkillers. A review.**

*Bull. nat. Res. Coun. Canada* 18, 1937, pp. 111, bibl. 650.

Observational, field, and laboratory experiments are reviewed and comments are made on various compounds. 39 tables contain detailed data on design and results of trials (see also H.A., 8: 46).

834. PAVLYCHENKO, T. K.

632.954

**Herbicidal action of chemicals on perennial weeds.**

*Sci. Agric.*, 1943, 23: 409-20, bibl. 3.

Experiments were devised by the Laboratory of Plant Ecology, Canada, to discover how lethal chemicals used as weed killers on perennial plants bring about the death of the plant, an aspect of weed eradication hitherto little studied. Evidence is brought to show that chemical herbicides eradicate perennial weeds not by direct destruction of all subterranean organs but indirectly by producing a durable stability of the top soil which prevents aerial growth until the underground parts not in contact with the chemicals perish of suffocation and starvation. Continuous tilling, by preventing aerial growth, has precisely the same effect. Chemicals in solution of herbicidal concentration applied to the foliage do not circulate through the plant system or reach the roots, since translocation is only possible as long as the protoplasm remains alive. In no case were chemicals detected in the plant roots below the actual leaching level of the soil.

835. WIGGINS, I. L.

632.51: 627.1

**The water hyacinth in California.**

*Science*, 1943, 97: 138-9, bibl. 3.

The troublesome water weed, *Eichhornia crassipes*, appears to be increasing in parts of the San Joaquin river. Hitherto, compared with Florida, California has been fairly free from the plant. The prospects of its increase to nuisance proportions are discussed. It is suggested that it would be cheaper to exterminate the plant now than wait till it has become a menace to navigation.

836. FRAZIER, J. C.

632.52

**Amount, distribution and seasonal trend of certain organic reserves in the root system of field bindweed, *Convolvulus arvensis* L.**

*Plant Physiol.*, 1943, 18: 167-84, bibl. 26.

837. BENNETT, S. H., AND OTHERS.

632.693.2

**Investigations on the destruction of moles. Poison baits. Abridged report.**

*A.R. Long Ashton Res. Stat. for* 1942, 1943, pp. 51-5.

The use of calcium cyanide dust as a source of HCN proved impracticable. Trapping required excessive skill and time.

Of poison baits tried, red squill was useless, arsenicals were of doubtful value but strychnine sulphate proved highly successful. The highly dangerous nature of such baits makes the discovery of a less dangerous poison desirable.

838. CHRISTIE, W.

632.693.2

**Moles.**

*Gdnrs' Chron.*, 1943, 113: 164.

M., W.

**Moles.**

*Gdnrs' Chron.*, 1943, 113: 239.

These two articles contain much unusual lore on the habits of moles; practical attention to the advice provided should greatly increase the numbers trapped.

839. RASMUSSEN, E. J.

634.11-2.95

**Effect of spray materials on finish and keeping quality of apples.**

*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 25: 263-71.

The amount of russetting and poor finish is influenced by the spray materials and by the season or a combination of both. Bordeaux and proprietary copper materials when applied to apple trees in Michigan in an all-season schedule (delayed dormant through first cover), produce fruit with poor finish when compared with trees sprayed with lime-sulphur or wettable sulphur. Varieties vary in their susceptibility to spray injury. Of the varieties studied, McIntosh and Jonathan were the most susceptible to copper injury. Delicious and Northern Spy are the most resistant, and Rhode Island Greening, Grimes Golden, Wagener, and Wealthy are intermediate in susceptibility to copper injury. Copper fungicides are not safe to use on McIntosh in any of the applications tried in these experiments. Copper fungicides are not safe to use on Jonathan in the early applications tried. They may be used in late cover sprays on Jonathan in some seasons without causing injury. Use of copper materials in an all-season schedule is not recommended on Northern Spy or Delicious. They may possibly be substituted for sulphur in some of the late applications. Further investigational work is necessary on these two varieties. It is suggested that at least an equal amount of lime be added to the copper fungicides when they are used on the more resistant varieties. Russeted fruit loses weight faster and shrivels sooner in storage than smooth-finished fruit. [Author's summary.]

840. BUSVINE, J. R.

632.951

**The search for new insecticides.**

*Nature*, 1943, 151: 690-2, bibl. 11.

The search for new insecticides (not necessarily in connexion with plant hygiene) is conducted along 3 main lines: (1) quantitative experiments; (2) observations on individual insects; (3) by means of mechanical models in studying penetration, adsorption, etc. A brief general review of each is given.

841. BRYMER, W.

632.95: 634.1/7

**Brüheverlust beim Spritzen der Obstbäume.**

**(The loss of mixture during spraying of fruit trees.)**

*Schweiz. Z. Obst- u. Weinb.*, 1943, 52: 309-13.

In order to determine the loss of spray mixture during spraying a 5 m. high pear tree was cut off just above the ground and weighed before and after spraying. The results of about 100 measurements after spraying the tree with and without leaves, under applications of various nozzles at different pressures, are recorded in 2 tables. With trees in leaf losses on a quiet day range from 41.5% to 67.4%, without leaves from 70% to 86.6%. A mist nozzle proved most uneconomical, especially in combination with high pressure. The best results were obtained with a slot or fan nozzle of 0.5 × 4 mm. on a 4 m. bamboo cane at pressures of 8-10 or 15 kg/cm<sup>2</sup>. It is believed that on a windy day or applied on a less compact tree the mist nozzle would compare even less favourably with the slot or fan



nozzle. The experiments were carried out at the Wädenswil Research Station.

842. JENNY, J. 632.85: 634.1/8  
Die Wirkung der Düse und des Druckes auf den Brühverbrauch beim Spritzen. (The effect of nozzle and pressure on the consumption of spray mixture.)

Schweiz. Z. Obst. u. Weinb., 1943, 52: 314-8.

The spraying efficiency of various types of nozzles, guns, and pressures is discussed. It would appear that according to the type of apparatus, pressure, etc., the amount of spray mixture used by 2 men in 1 hour would vary from 350 to 500 litres at a cost of 2-4 litres of petrol or 0.8-1.5 kwh. per 1,000 litres of spray mixture.

843. GOLDSWORTHY, M. C., GREEN, E. L., AND SMITH, M. A. 632.952

Fungicidal and phytocidal properties of some metal dialkyl dithiocarbamates.

J. agric. Res., 1943, 66: 277-91, bibl. 10.

In order to determine the fungicidal and phytocidal properties of metal dialkyl dithiocarbamates, which have been used successfully as insecticides, some metal salts were tested. Soluble sodium, selenium, copper, and mercury salts killed all the plants used, while the salts of iron, zinc and silver were harmful to a varied degree. Lead dimethyl derivatives caused no damage to any of the plants, had very good fungicidal properties, and seemed the most promising of all the materials tested. The iron and zinc dimethyl derivatives were also highly fungicidal. All three derivatives can be made up in a spray tank. They remain in suspension and have superior sticking qualities. Field tests with ferric dimethyl dithiocarbamate, conducted on a small scale in Maryland and Missouri, gave good results for the control of peach scab and rot. The spray though causing leaf spotting did no injury to the fruit. Leaf spot on cherry was not controlled.

844. LOEWEL, E. L. 634.1/8-2.95  
Dinitrokresol als Winterspritzmittel im Obstbau. (Dinitrocresol as a winter spray of fruit trees.) Gartenbauwiss., 1942, 16: 509-24, from abstract Forschungsdienst, 1942, Vol. 14, abstr. p. 77.

In experiments undertaken to replace the tar oil sprays by a better substitute the author found dinitrocresol superior to carbolineum for late dormant sprays, particularly for controlling winter moth.

845. EVANS, J. W. 632.654.2: 634/635  
Orchard and garden mites and their control. Tasm. J. Agric., 1943, 13: 140-2.

HUTSON, R. 634.8-2.78

Spraying for control of grapeberry moth [*Polychrosis viteana*] and grape leaf hopper [*Erythroneura comes*].

Quart. Bull. Mich. agric. Exp. Stat., 1942, 24: 287-90.

ANON. 632.78

La carpocapsa. (Codling moth in Argentina.) Sugest. oportun. Fruticult. Rio Negro, April 1943, pp. 1-5.

LINDNER, R. C., AND REEVES, E. L.

634.25-2.951

Arsenic injury of peach trees: a disorder sometimes confused with western X-disease.

Proc. Wash. St. hort. Ass. 38th annu. Meet. 1942, 1943, pp. 37-40, bibl. 3.

KADOW, K. J., AND HOPPERSTEAD, S. L.

632.95

An evaluation of new spray equipment.

56th Trans. Peninsula hort. Soc. 1942, 1943, pp. 13-18.

Notes on new speed sprayer and adaptations thereof.

## VEGETABLES, FIBRES AND DRUGS.

846. SECRETT, F. A. 635+634

Horticulture in peace and war.

J. Fmrs' Club, Lond. 1943, part 4, pp. 61-76.

In this paper, presented at a meeting of the Farmers' Club in London, the past, present and future of all branches of commercial horticulture are discussed. Mention by name, salted with a few anecdotes of their peculiarities, is made of those early growers who were the pioneers of modern horticulture. A review is given of the development of specialized branches of horticulture in various parts of the country and the reasons are briefly assessed. The financial difficulties in which vegetable growers have often found themselves are attributed to the production by farmers when farming conditions were bad of large quantities of vegetables inferior in quality but cheap, and to the one-time unrestricted import of continental vegetables. These were often out of season, so that when their English-grown counterparts reached the market public interest had flagged and prices were down. The need for a first-class vegetable research station is stressed. Work on experimental farms is not sufficient. The author possesses, but withheld for lack of time, opinions on what is required. The effect of the war upon horticulture and of horticulture on the war is considered and the author expounds the reasons for some of the controversial orders issued by the various Ministries concerned in food production and distribution. He illustrates his remarks by quoting six awkward questions which he was frequently called upon to answer. In certain of them, such as why fifteen different licences were necessary to sell eight commodities, he admits some modification might be made; for the rest he is able to show that the Orders had some other reason for their issue than just to make everything more difficult. The interests of small grower-wholesalers and

grower-retailers should be carefully watched. The services of these men are particularly valuable at the present time and are not fully appreciated. They grow for definite markets, and use little transport and few containers. They must be allowed to function in the future as in the past, for any future scheme of marketing, compelling them to consign their produce to distant markets for sale on commission, with all the resulting expenses, would drive them out of business and deprive the country of their services. In the matter of agricultural education the author is definite that the only education necessary for a boy starting in practical horticulture, either on his own farm or as manager, is a school certificate and a thorough knowledge of where information on scientific matters affecting the industry can be obtained. University students have always been found the most difficult to train for practice. The paper concludes with a tribute to the work of the Women's Land Army which has made a powerful contribution towards feeding the nation.

847. TAYLOR, H. V., AND SECRETT, F. A. 635.1/7  
Winter vegetables.

Agriculture, 1943, 50: 130-3.

Brief notes helpful in the cultivation of wartime winter vegetables, chiefly brassicas and leeks.

848. HEUPKE, W., AND SCHÖLLER, R. 633.31: 613.2

Über die Verwendung der Luzerne als menschliches Nahrungsmittel. (The use of lucerne as a human food.) Ernährung, 1942, 7: 161, from abstract Dtsch. Heilpfll., 1943, 9: 36.

Alfalfa owes its name to the Arabs who reintroduced this crop to Spain whence it spread to France and Germany.

Blue alfalfa, *Medicago sativa*, which could be grown in vineyard and hop districts only, can now be cultivated also on poorer soils. Sand alfalfa, *Medicago media*, does not demand such favourable conditions. Alfalfa hay contains 10-20% protein, considerable lime, 32 mg.% carotene, and vitamins A, B<sub>1</sub>, C and K. Alfalfa leaves containing 8-1% proteins are richer in proteins than most vegetables. The authors found that the leaves without petioles prepared like spinach were almost completely digested by man, thus representing a valuable food. The only objection to its general use is that alfalfa contains a good deal of bitter principle.

849. WENT, F. W. 631.544: 581.14  
Plant growth under controlled conditions. I. The air-conditioned greenhouses at the California Institute of Technology.  
*Amer. J. Bot.*, 1943, 30: 157-63.

A complete description is given of the construction and operation of a set of air-conditioned greenhouses. Two independent units, consisting each of a greenhouse and a dark room, are conditioned by two air-conditioning systems, so that different conditions can be maintained in the two systems. Most plants are grown on movable tables, so that by shifting the tables from one room to another, plants can be subjected to a wide variety of light and temperature conditions. [From author's summary.]

850. BOETTNER, J. 635.1/7: 631.544  
*Neuzeitlicher Gemüsebau unter Glas.* (Modern cultivation of vegetables under glass.) 9th edit. Trowitsch & Sohn, Frankfurt a.d.O., 1942, pp. 106, RM. 4, from review *Forschungsdienst*, 1942, Vol. 14, abstr. p. 80.

This 9th edition embodies the latest research work on all forms of vegetable cultivation under glass for the use of the practical man. Special consideration is given to the former flower grower who has had to switch over to vegetables.

851. HAMMER, W., AND OEHLKERS, F. 631.436: 631.544: 631.588.1  
Versuche über elektrische Bodenbeheizung im Freiland durch Heizkörper mit punktförmigen Heizstellen. Vorläufige Mitteilung. (Electrical soil heating in the field with punctiform heating elements. Preliminary report.)  
*Angew. Bot.*, 1942, 24: 484-90.

Small heating spirals are fitted in tubes of 15 mm. diameter and 30-40 cm. length. The ends of the tubes containing the spirals are stuck into the soil and their free ends are connected with each other and with the main. This is done after the cultivation of the soil has been completed. Then the plants are put into the soil close to the heating spirals. Each spiral has a potential of 1-1.5 volts, so that a group of twenty tubes connected in series requires 20-30 volts. A transformer is necessary and this will also provide the advantage of low voltage. The average temperature of the soil\* in March and April is 4-5° C. too low. To raise the temperature of a ball of soil, of the size of a small fist, 4-5° C., 1-1.5 watts are required which means about 0.5-0.75 kwh. for a heating period of 20 days.

852. CAROLUS, R. L. 631.417: 635.1/7  
Soil management practices for Peninsula vegetable growers.  
55th Trans. *Peninsula hort. Soc.* 1941, 1942, pp. 69-72, bibl. 2.

The paramount necessity of maintaining the organic matter content of the soil is stressed.

\* Probably at Freiburg, where the experiments were carried out.

853. POLLARD, A. G., AND SMITH, C. W. R. 631.346: 631.423  
Soil studies at Wisley, Part II. Further observations on potted soils.

*J. roy. hort. Soc.*, 1943, 68: 239-42.

Further investigations were made at Wisley into the causes of the marked decrease in the concentrations of plant nutrients in the soil solution of pots. Loss due to drainage accounts for a large proportion of lime removed from the pot, but does not explain the decrease in nitrogen, phosphate and, to a somewhat lesser extent, in potash. The authors believe that the pot walls accumulate nutrient salts in the pores as a residue of water evaporation. By influencing the nutrient conditions the size of the pot has a bearing on amount and character of plant growth. The importance of providing sufficient nutrient salts for the potting soil to counterbalance losses is emphasized.

854. FAULKNER, R. P. 631.516  
To hoe or not to hoe.  
*Gdnrs' Chron.*, 1943, 113: 238-9.

The arguments for and against hoeing are examined, the author hopes impartially. He concludes from the evidence and from his own experience that the maintenance of a loose surface mulch does help to conserve moisture in times of drought.

855. MUNSELL, R. I., AND BROWN, B. A. 635.1/7: 581.192: 546.27  
The boron content of certain forage and vegetable crops.

*J. Amer. Soc. Agron.*, 1943, 35: 401-8, bibl. 10.

The experiments were carried out at the Agricultural Experiment Station, Storrs, Connecticut. After spinach legumes were the highest in boron content, followed by root crops, all vegetables, grasses, and cereals. Of the various parts of the soybean the leaf had the highest boron content, followed by the petiole, stem, and root. The boron content did not decrease in alfalfa, vegetables, or root crops on Merrimac soils when the rate of liming was doubled. 20 lb. of borax per acre prevent boron deficiency in alfalfa, turnips, mangels, cabbage, carrots, lettuce, and spinach. A table suggests the size of sample to use in analysing plants of varying boron content.

856. MILTHORPE, F. L., AND HOROWITZ, B. 635.1/7: 614.014.44  
The effect of length of day and temperature on the flowering, seed production and growth of vegetables.  
*Agric. Gaz. N.S.W.*, 1943, 54: 53-7, bibl. 16.

A brief outline of the factors involved is given with some examples which may be of use to seed growers in New South Wales. The most favourable conditions to produce seeding in beet are temperatures of 40-50° F. and long days, i.e. over 12 hours. Seeding in cabbage is influenced by low temperatures and cabbages can be quickly brought to seed by storing at a temperature of 40° F. for 2 months and then growing in the field at temperatures of 60-70° F. White turnips and swedes respond to similar treatment. Cauliflowers do not require so low a temperature as other brassicas but the leafy part of the plant should be fully developed before low temperatures occur. Carrots require exposure to temperatures of 40-60° F. for 2 months for seed stem initiation. Their most favourable temperature for shapely root formation is 60-70° F. Higher temperatures shorten roots and decrease yield. The best coloured roots are produced at 60-70° F. in fairly dry soil. Carrots of good colour, deep orange red, have a higher vitamin A content than pale roots. Seeding in celery is delayed if the plant is checked but may, however, be prematurely produced by exposure to relatively low temperatures, 40-50° F., for more than 2 weeks. Thus too early spring planting may produce this effect. With lettuce germination at high temperatures, 70-80° F., followed by low temperature conditions markedly increases fresh weight and therefore market value. Low



temperature treatment for 10-20 days at 40° F. during germination and early growth stimulates seeding. Onions vary greatly in day length requirements for seeding. The respective requirements of some popular varieties are tabulated. In general long days and relatively low temperatures are necessary. Higher temperatures result in bulb formation. Some further useful data are given concerning methods of influencing seed or bulb production. Fruit setting in tomatoes is influenced by warm temperature in association with a balanced nutrition. A higher nitrogen level is necessary at the higher temperatures. The ideal conditions for seed production in tomato are moderate vegetative vigour, a mean daily temperature of 60-70° F. and a high light intensity. Low humidity combined with high temperatures results in blossom shedding.

857. NIETHAMMER, A. 631.531  
Plasmolysestudien an gärtnerisch wichtigem  
Saatgut. (Plasmolysis studies on horticultural  
seeds.)

Gartenbauwiss., 1942, 17: 91-4, from abstract  
Forschungsdienst, 1942, Vol. 14, abstr. p. 80.

Plasmolysis studied in microscopic sections of swollen seeds can give an approximate indication of the germinating capacity at the time. The salts of heavy metals such as nickel potassium cyanide, nickel sulphate, copper sulphate, as well as potassium nitrate, zinc sulphate, and cobalt nitrate were satisfactory as plasmolytic agents in concentrations of 0.25-1 molar.

858. CROXALL, H. E., AND OGILVIE, L. 631.531.17  
Experiments with protectant seed dressings 1940-42.  
A.R. Long Ashton Res. Stat. for 1942, 1943,  
pp. 65-76, bibl. 9.

1. Greenhouse and field experiments showed that, when untreated pea seed was subject to pre-emergence damping-off, increased emergence was obtained by treating the seed with cuprous oxide, proprietary organo-mercury dressings and a proprietary product, Sperton, respectively. 2. In dry soil round-seeded peas treated with yellow cuprous oxide, red cuprous oxide and an overdose of a proprietary organo-mercury dressing gave an emergence lower than that of untreated seed. 3. Isolations from pea seeds sown in garden soil indicated that *Pythium* spp. were the chief causes for rotting of pea seeds before germination. *Rhizoctonia solani* was also shown to be pathogenic. 4. Some improvement in the germination of tomato seed was obtained by seed treatment, but onions, cabbage, savoy and flax did not benefit from seed dressings in the small number of experiments made. [Authors' summary.]

859. TABOR, P. 631.531  
A single-disc scarifier for small lots of seed.  
J. Amer. Soc. Agron., 1943, 35: 256-7.

The scarifier consists of a commercial mandrel and a locally constructed ply-wood disc and hood.

860. OGILVIE, L. 635.1/7: 632.3/4  
Control of vegetable diseases in wartime.  
Occas. Publ. sci. Hort. 4, 1943, pp. 22-4.

Seed treatments. Pea seed sown before April under cool damp conditions gives an increased stand if dusted with organo-mercury dusts (Ceresan and others) or cuprous oxide dusts. Treatment can be effected by means of an old milk churn. Cuprous oxide needs the addition of graphite to prevent sticking in the drilling machine. The stimulation of growth claimed to follow the use of seed dressings is probably due to the preservation of the cotyledons from decay. The experimental addition of growth substances to seed dressings gave definite stimulation to peas under unfavourable (dry) conditions but not to tomatoes, dwarf beans, lettuces or sugar beets. Cuprous oxide seed dressings

increase emergence of tomato, lettuce, cucumber and marrow. Organo-mercury dressings assist beet, brassica and tomato but injure lettuce and onion. Zinc oxide is of general utility. The non-poisonous tetrachloroparabenzoquinone has given promising results in U.S.A. Damping off can be largely prevented by hygienic and cultural measures. Watering the soil with cuprous oxide suspension,  $\frac{1}{2}$  oz. per gal., may give control in tomato foot rot epidemics. Lettuce diseases. Botrytis of lettuce under glass seldom appears where a heavy initial watering is given before planting and the temperature is kept uniform. Mosaic and ring-spot of overwintered lettuces are prevented by putting the plants out from boxes in early spring. Downy mildew can be controlled by applying a protective spray in the seedling stage or if under glass by raising the temperature to 60° F. for 24 hours. Onions affected with downy mildew or mosaic should be weeded out. To control Botrytis bulb rot avoid heavy nitrogenous manuring and late hoeing, ripen well and ventilate in storage. Tomato. Cladosporium is kept in check if a constant air movement can be maintained through the house. A top dressing of peat will often result in a fair crop from plants badly affected with root rot or eelworm. Outdoor tomatoes must be sprayed, preferably with colloidal copper sprays. Carrot. Soft rot of carrots at Long Ashton was eliminated by rejection of diseased roots when clamping. Pea. A soil dressing of sulphate of ammonia may result in a good crop in root rot infected soil. Club root of Brassicaceae. Add 1 level dessert spoonful of 4% calomel dust and the same of hydrated lime to each dibble hole at planting. A brief note is given on mineral deficiency diseases. The importance is stressed of roguing out all diseased plants where seed is to be saved.

861. WRIGHT, D. W. 635.1/7: 632.6/7  
Some insect pests of vegetable crops.  
Occas. Publ. sci. Hort. 4, 1943, pp. 20-1, bibl. 4.

Two pests are dealt with, the onion fly (*Hylemyia antiqua*) and the cabbage root fly (*H. brassicae*). Satisfactory control of the onion fly can be obtained (1) by treating the seed before sowing with an equal weight of pure calomel or (2) by applying 4% calomel dust along the rows after the seedlings are in the loop stage of development, about 1½ inches high, at the rate of 1 lb. dust per 50 row-yards (2½ cwt. per acre for rows 1 ft. apart). If, however, the loop stage has passed in April the dust should be applied the first week in May. This latter date also applies to autumn-sown onions which usually escape attack in the year of sowing. Cabbage root fly, while it may not kill the plant, injuriously affects size and quality, the damage being caused by the root feeding maggot. Control is effected by applying 4% calomel dust as close to the stem as possible the last week in April or within 4 days of setting out if after that date. The rates of application are for cauliflowers, savoy and summer cabbage a single application of 45 lb. per acre for plants set 3 ft. each way, for brussels sprouts and broccoli 2 applications of 30 lb. per acre with about a fortnight's interval. Improvement of yield in experiments has been from 30 to 100%. The great importance to brassicas of an undamaged root system is exemplified by experiments, of which a brief note is given.

862. GRAME, E., AND BOVIEN, P. 632.1/8: 635.1  
Rodfrugternes Sygdomme og Skadedyr. (Diseases  
and pests of root crops.)  
Copenhagen, 1942, pp. 125, from review Angew.  
Bot., 1943, 25: 197-8.

The diseases and pests of beetroots, sugar beets, turnips, rapes, and carrots are dealt with. They include physiological troubles. Control measures are described in each chapter, and the concluding part of the book is devoted to the general aspects of disease and pest control.

863. BENNETT, S. H., AND KEARNS, H. G. H.

632.765  
A method of washing out wireworms from soil samples.

*A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 49-50, bibl. 1.*

The method which consists of washing the soil through 4 sieves of different mesh by means of medium pressure water is described and illustrated.

864. LIMAN, H. K. 632.954: 635.1/7

*Die Unkrautbekämpfung im Gemüsebau unter besonderer Berücksichtigung chemischer Methoden. (Weed control in vegetable growing with special reference to chemical methods.)*

No. 4 of the series *Leistungssteigerung im Gartenbau*, R. Bechtold & Comp., Wiesbaden, pp. 92, from review *Angew. Bot.*, 1943, 25: 198.

The application of 170 cm<sup>3</sup> of 10% sulphuric acid or carbolineum per 1 m<sup>2</sup> gave satisfactory results against weeds of vegetable crops. Carbolineum IV, a phenol-containing, strongly disinfectant tar oil, had a still better effect.

865. LINDEMUTH, K. 632.954

*Versuche zur Bekämpfung der Saatwucherblume und des Franzosenkrautes. (The control of corn marigold [*Chrysanthemum segetum*] and *Galinsoga parviflora*.)*

*Angew. Bot.*, 1943, 25: 79-92, bibl. 11.

From his trials at Kiel on the control of *Chrysanthemum segetum* (corn marigold) and *Galinsoga parviflora* the author concluded that neither spraying nor dusting with caustics nor liming of sandy soils, where these weeds thrive particularly well, has any effect. The application of 40 kg. lime nitrogen per acre, early ploughing in autumn and early sowing of summer cereals in harrowed soil are recommended as control measures. In asparagus cultures *Galinsoga* could be controlled by the application of 150 litres of a 2% carbolineum solution per 100 m<sup>2</sup>. This measure gave good results also after levelling off of the beds when the cotyledons of the weed began to show. The solution was not injurious to the next year's crop.

866. RAYCHAUDHURI, S. P. 633.37-2.48

*A disease of pigeon-pea (*Cajanus cajan* (L.) Millsp.) caused by *Diplodia cajan*.*

*Indian J. agric. Sci.*, 1942, 12: 837-47, bibl. 5.

A new fungus species, *Diplodia cajan*, was identified at Dacca University as the cause of canker in the collar region of the pigeon-pea, *Cajanus cajan*. Thickening and distortion near the collar, followed by lesions, which are ultimately transformed into deep-seated cankers, are the symptoms. Since the attack of the fungus was found to be very virulent only when the collar region had been previously wounded, the disease could be kept in check by avoiding injuries to that region.

867. COPISAROW, M. 633.491-1.532.2

*Potatoes and war economy.*

*Nature*, 1943, 151: 421-2, bibl. 4.

Experiments on the cultivation of potatoes (Albert Victor purple) from tuber cuttings and peelings carried out since 1937 by Mr. A. McI. Cleland of Macedon, Green Road, Knock, Belfast, on light loam are discussed. The tuber cuttings consisted of an eye attached to a section of potato about  $\frac{1}{2}$  in. in diameter and  $\frac{1}{4}$  oz. in weight. They were planted in shallow boxes early in spring and the sproutings re-set on the plot 9 in. apart towards the end of May. The yield consisting of 804 tubers weighing 172 lb. plus a large number of seed potatoes was provided by 288 eyes from 24 lb. of potatoes. Peelings, being freshly collected kitchen waste, were broadcast, avoiding overlapping, on a garden bed and lightly covered with soil at regular intervals from the beginning of May to mid-June. The plantings sprouted freely and produced 32 lb. of usable potatoes besides many

seed tubers. Both crops were free from disease and of good quality (as in accordance with the Russian observations, *Nature*, 1942, 150: 456-7; *H.A.*, 12: 1369). It is suggested that the acceleration of seed potato sprouting by the mechanical removal of the skin (loc. cit.) could perhaps be substituted by such treatment as oxidation with potassium permanganate, or by dissolution of the outer covering with cuprammonium sulphate, followed, if necessary, by contact with organo-mercury compounds effected by a conveyor belt dipper.

868. POLUNIN, N. 633.491-1.532.2

*Potatoes and war economy.*

*Nature*, 1943, 151: 587-8, bibl. 3.

The author refers to the success of the Russians in increasing their total area under potatoes by 100,000 ha. in 1942, in spite of huge losses in territory and materials, by the use of potato sections of various kinds in place of whole tubers. He calls attention to the present waste in England caused by planting large ware tubers whole or cutting them into haphazardly small pieces. Some of these uncertified tubers average more than 8 oz. each and are sold at exorbitant prices under the label Scotch Class 1; the other extreme is exemplified by the American potato eye trade. The author's own experiments show that without laborious early planting in boxes cut pieces of less than 20 g. in weight are unlikely to prove practicable in England. Nevertheless the Russian and American methods should be studied with a view to their application in emergency. The advantages of adopting in England a system of cutting potatoes into moderate sized pieces urged by him are that it can be done mechanically on a large scale and would result in a saving in carbohydrate material otherwise returned to the soil, in the elimination of the labour of separating seed from ware, in economy in fuel and transport, in a speedy reduction in degeneration, since small tubers are the more heavily infected with virus, and in better disease control, since all our acreage could then be grown from certified stock. Cutting should be transverse and into square-faced chunks for various reasons which are cited. Pieces if not planted immediately must be kept moist (e.g. covered with damp sacking) for 12-24 hours at 10° C. Planting should be somewhat closer than with whole tubers.

869. DOSTÁL, R. 633.491-1.531

*Über die Möglichkeit der Steigerung der Kartoffelernte durch Vorbehandlung des Pflanzgutes mit Leuchtgas. (Raising the potato yield by subjecting the seed to illuminating gas.)*

*Bodenk. PflErnähr.*, 1942, 28: 362-82, from note *Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.)*, 1942, 33: 462T.

Potato tubers were subjected to gas fumes at concentrations of 30, 15 and 7.5%, in 10 litre jars, at temperatures of from 18° to 20° C. for 24 hours in trials in 1940 and 1942 at Brünn. They were then planted immediately or with a delay of 1 or at most 2 days. Out of 15 varieties tested, 4 showed considerably increased yields following treatment, the others no difference or decreased yields.

870. LeCLERG, E. L., AND HENDERSON, M. T.

633.491

*Studies on the association of heat sprouting with rest period and maturing time in Irish potatoes.*

*Amer. Potato J.*, 1943, 20: 28-33.

Heat sprouting or the growth of tuber buds prior to harvesting sometimes follows a period of hot dry weather producing high soil temperature with low soil moisture. In the experiments discussed, undertaken by the Agricultural Research Administration, U.S.A., the presence of heat sprouts was found to be in inverse ratio to the relative length of the rest period peculiar to the plant. Those segregates having a naturally long rest period, e.g. early maturing plants, produced very few heat sprouts as compared



with late maturing plants. The rest period is here defined as the period of time following maturity during which the tuber will not respond to favourable growth conditions: there is a further period during which the tubers remain unspouted only in the absence of favourable circumstances. The two periods combined make up the dormancy period.

871. SILBERSCHMIDT, K., AND KRAMER, M. 633.491: 581.02

A influencia da altitude sobre a degenerescencia da batatinha no estado de São Paulo. (Influence of altitude on degeneration of potato in the State of São Paulo, Brazil.)

Rev. Agric., S. Paulo 1943, 18: 1-105, bibl. 28.

Three hundred halves of Eigenheimer potato tubers were planted in the São Paulo mountain districts at 1,300-1,350 metres, the companion halves on the plain at 500-700 metres. Those planted in the mountain districts preserved their vitality and productivity for a greater number of generations than those in the plains. A visit to the mountains of a set of plain-grown tubers of the second generation brought about a temporary restoration to health, which disappeared in the following generation.

872. WALLACE, T., CROXALL, H. E., AND PICKFORD, P. T. H. 633.491-1.8

Field experiment on the manuring of potatoes. A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 38-43, bibl. 2.

1. Potatoes were grown on plots in 1942 on which a manurial experiment on black currants had been in progress over the period 1927-1941. No manures were applied to the potatoes so that they were grown on the residues from the applications made to the black currants. 2. Leaf symptoms of deficiencies of potassium and magnesium were prevalent on the plots, the former where potash had not been given to the black currants and the latter where potash had been applied. Magnesium deficiency symptoms were less evident where farmyard manure had been given and where dressings of magnesium sulphate had been applied in 1940 and 1941. 3. The highest yields were obtained on the farmyard manure plots and the lowest where potash was not given. 4. Cooking quality was adversely affected by deficiencies of potassium and phosphorus and these deficiencies were associated with blackening. The highest quality resulted where nitrogen was omitted from the complete fertilizer. [Authors' summary.]

873. JONES, J. O., AND PLANT, W. 633.491-1.8: 581.192

Note on the composition of leaves from potato manurial experiment.

A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 44-5.

The effect of treatments given to black currants, which were the previous crop [see last abstract] on the ash content of potato leaves was found to be significant in the case of ash, calcium, magnesium, potassium and phosphorus. Significant differences between treatments were indicated. The deficiency symptoms of potassium and magnesium were found to agree with the chemical analysis of the leaves.

874. ASSOCIATION OF APPLIED BIOLOGISTS. 633.491-2.8

Discussion of potato virus diseases.

Ann. appl. Biol., 1943, 30: 80-108.

(I) SAMUEL, G.

Potato virus diseases: introduction, pp. 80-2, bibl. 4.

(II) BAWDEN, F. C.

Some properties of the potato viruses, pp. 82-3.

(III) SMITH, K. M.

Some practical difficulties in the production of virus-free seed potatoes, pp. 84-5.

(IV) WHITEHEAD, T.

Some factors influencing the health of seed potato stocks in North Wales, pp. 85-96, bibl. 3.

(V) THOMAS, I.

Ecology of potato aphides in North Wales, pp. 97-101.

(VI) DONCASTER, J. P.

The life history of *Aphis (Doralis) rhamni* B.d.F. in eastern England, pp. 101-4.

(VII) GREGORY, P. H.

The spread of potato virus diseases in the field, pp. 104-5.

(VIII) COCKERHAM, G.

Potato breeding for virus resistance, pp. 105-8, bibl. 8.

875. WILSON, G. F. 633.491-2.7

Potato tuber injury due to soil pests.

J. roy. hort. Soc., 1943, 68: 206-14.

The chief soil pests of potato tubers exclusive of the potato root eelworm, such as keeled slugs, millipedes, cockchafer grubs, wireworms, leatherjackets, swift moth caterpillars, and cutworms are dealt with.

876. GEMMELL, A. R. 633.491-2.651.3

The resistance of potato varieties to *Heterodera schachtii* Schmidt, the potato eelworm.

Ann. appl. Biol., 1943, 30: 67-70, bibl. 4.

Epicure followed by Doon Star proved more resistant than Golden Wonder and Majestic at Glasgow University.

877. STANILAND, L. N. 633.491-2.753

A survey of potato aphides in the South-Western Agricultural Advisory Province.

Ann. appl. Biol., 1943, 30: 33-42, bibl. 12.

WARE, L. M.

633.491-1.87+1.67  
The value of organic matter and irrigation in the production of potatoes in Alabama.

Amer. Potato J., 1943, 20: 12-23, bibl. 4.

DYKSTRA, T. P.

633.491-2.8  
Potato virus diseases: review of literature 1941.

Amer. Potato J., 1942, 19: 267-79, bibl. 28.

STEVENSON, F. J., FOLSOM, D., AND DYKSTRA, T. P.

633.491-2.8  
Virus leaf roll resistance in the potato.

Amer. Potato J., 1943, 20: 1-10, bibl. 5.

KÖHLER, E.

633.491-2.8  
Untersuchungen über das "K-Virus" der Kartoffel. I. Mitt. (Investigations on the

"K-virus" of the potato. Preliminary report.)

Angew. Bot., 1942, 24: 118-30, from abstract

Forschungsdienst, 1942, Vol. 14, abstr. p. 76.

KÖHLER, E.

633.491-2.8  
Untersuchungen über das K-Virus der Kartoffel. II. Mitt. (Investigations on the K-virus

of the potato. 2nd Report.)

Angew. Bot., 1943, 25: 13-23.

BLACK, L. M.

633.491-2.8  
Some relationships between potato yellow-dwarf virus and the clover leaf hopper.

Phytopathology, 1943, 33: 363-71, bibl. 7.

ANON.

633.491-2.95  
Potato spraying and dusting machinery.

Agriculture, 1943, 50: 186-7.

878. ANON. 633.5

Starker Faserpflanzenanbau im besetzten mittleren Ostraum. (Large scale cultivation of fibre

yielding plants in occupied Russia.)

Forschungsdienst, 1942, 14: 349-50.

It is intended to raise the cultivation of flax and hemp in the occupied parts of Central Russia to the level of 1941.

Since the destruction of the mills the peasants have taken to working at home.

879. TILT, J. 633.52  
Flax experimental work. Results of 1941-42  
season's trials.

*Tasm. J. Agric.*, 1942, 13: 125-34.

Results of experiments with flax carried out by the Tasmanian Department of Agriculture on private estates in various parts of the island and at the Cressy Research Farm are reported. Tables from each district show a gradual reduction in the height of the crop corresponding with the increases of the rates of seeding, due to the greater competition. A seeding rate of 70 lb. per acre appeared most profitable. A higher rate (110 lb.) gave a higher yield by 34 lb., but insufficient to pay for the extra cost of the seed. Tests of time of sowing showed a difference of 9.6 cwt. increase in yield in favour of autumn sowing. In some high-rainfall districts autumn-sown crops make excessive growth and become lodged. Here spring sowing is necessary and the earlier this can be done (after July) the taller will be the crop and the better the yield. In trials on methods of sowing rolling prior to drilling gave a significant increase in germination compared to non-rolling; drilled plots gave a significant increase over broadcast plots. Manurial trial results varied with the type of soil, but in general it can be said that flax responds to artificials in a similar manner to cereals. There is a good response to sulphate of ammonia on poor or heavily cropped land but on land recently broken out of pasture the effect of nitrogen application will be light.

880. McCANN, J. McC. 633.52  
Field investigations with flax.  
*J. Dep. Agric. Vict. Aust.*, 1943, 41: 197-202.

At the request of the Flax Production Committee experiments were designed with the main object of comparing the two flax varieties Liral Crown and Concurrent at different rates of seeding and times of sowing in different parts of Victoria. It is concluded from the results that there is no significant difference in yield between the two varieties. Best results were obtained from plots planted in mid-May. In rotation trials flax after pasture gave the highest yields, but flax may be grown for two years in succession on the same land, if it has not previously grown this crop.

881. MUSKETT, A. E., AND COLHOUN, J. 633.52-2.4  
The prevention of seed-borne diseases of flax by seed disinfection.  
*Ann. appl. Biol.*, 1943, 30: 7-18, bibl. 22.

An account is given of an investigation of the prevention by seed disinfection of seed-borne diseases of flax in Northern Ireland, especially stem-break and browning (*Polyspora lini*) and seedling blight (*Colletotrichum lini*). Seedling blight was satisfactorily controlled by the short-wet method using an organo-mercurial in solution. The best results, however, were obtained with tetra-methyl thiuram disulphide as RD 7846 (Nomersan) used as a dry dust. Prevention of stem-break and browning was fairly satisfactory but never completely accomplished by the short-wet method and by the fixation of an organo-mercury powder to the seed. Nomersan was less effective against this disease than the organo-mercury powders and no improvement was obtained by fixing it to the seed. The application of the results obtained to field and industry are discussed. The cost of disinfection with tetra-methyl thiuram disulphide, of enough seed to sow one acre, was 2s. 6d. in 1942, a relatively cheap insurance against heavy damage.

882. NATTRASS, R. M. 633.52-2.4  
The Pismo disease of flax in Kenya (*Sphaerella linorum* Wollenweber).  
*E. Afr. agric. J.*, 1943, 8: 223-6, bibl. 10.

A sudden and widespread attack of "Pismo" disease, caused by the fungus *Sphaerella linorum* Wollenweber, occurred in Kenya for the first time in 1941. Field sanitation

and crop rotation as well as burning of straw and stubble in the case of linseed and of crop debris in the case of flax are the generally recommended control measures. In addition the seed should be disinfected according to Professor Muskett's "short-wet" treatment.

883. McPHERSON, G. K. 633.52-1.55  
Harvesting of linen flax.  
*N.Z. J. Agric.*, 1943, 66: 283-7.

884. KUNDU, B. C., AND PRESTON, R. D. 633.522: 581.44  
The fine structure of phloem fibres. I. Untreated and swollen hemp.  
Reprinted from *Proc. roy. Soc., Lond.*, 1942, ser. B, 128: 214-38, bibl. 33.

Phloem fibres of hemp are thought to be built up of cellulose chains running in a steep spiral. The difference in swelling capacity between the inner and outer layer and the middle layer appears to be connected with the nature and amount of the incrusting substances. Evidence in support of the theory of crystal structure suggests that the cellulose composing the inner and outer layer differs in configuration from the middle layer. Lateral swelling involves longitudinal shrinking thus accounting for transverse cracks. There are indications of a change of cellulose chain direction in the course of development.

885. TOBLER, F. 633.526.9  
Stengelbau, Festigkeits- und Verwertungsunterschiede beim Schilfrohr (*Phragmites communis* Trin.). (Anatomy of the stem and differences in utilization of the common reed.)  
*Angew. Bot.*, 1943, 25: 165-77.

In order to determine the suitability of the common reed for cellulose manufacture its anatomy was studied. The stem was found to yield more cellulose than the leaves, but there was no difference in cellulose yield between the submerged parts of the stem and the parts above water in spite of a slightly different microchemical reaction of the two. After storage for one year somewhat less sodium hydroxide was required to decompose the reeds whilst an increase in cellulose content and a decrease in silicose acid content was noted.

886. KALAPTSCHIEFF, G. D. 633.51  
Untersuchungen über die natürlichen und wirtschaftlichen Bedingungen und die Aussichten des Baumwollbaues in Bulgarien. (Conditions and prospects of cotton cultivation in Bulgaria.)  
*Ber. Landw.*, 1942, 26: 477-548, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 79.

887. OSMOND, D. A. 633.63-2.19: 546.27  
A note on heart-rot in sugarbeet in Herefordshire.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 46-8, bibl. 1.

Investigations showed that heart rot of sugarbeet due to boron deficiency was fairly widespread in Herefordshire and that it was associated with soils which contained a small amount of water soluble boron together with a high calcium carbonate content and showed pH values usually over 7.0.

888. LYNES, F. F., AND LITTLER, R. J. 633.63-2.753  
Control of aphids on sugar beets under greenhouse conditions.

*J. Amer. Soc. Agron.*, 1943, 35: 80.  
Weekly fumigation using 1 c.cm. of a 40% nicotine compound per 100 cubic feet gave complete control of aphids in the greenhouse. 3 shallow containers were placed along the middle walk on electric hotplates operated by an automatic device. After sunset heat was applied for 75 min. during which time the liquid was vaporized.



889. BERKELEY, G. H., AND PHILLIPS, J. H. H. 633.71-2.8  
Tobacco streak.  
*Canad. J. Res.*, 1943, 21: 181-90, bibl. 7.  
The incubation period for tobacco streak virus was found to be 6-14 days when transmitted by patch-grafting and 4-10 days by juice transfer. Streak virus did not overwinter in the soil to infect healthy plants the following season. The authors proved that the virus spreads to tobacco from nearby sweet clover; probably some weeds must also be regarded as virus carriers. Tobacco should therefore not be grown in the vicinity of sweet clover, and weeds around the tobacco field should be destroyed.
890. FOSTER, H. H. 633.71-2.411  
Resistance in the genus *Nicotiana* to *Phytophthora parasitica* Dastur var. *nicotianae* Tucker.  
*Phytopathology*, 1943, 33: 403-4.  
Thirteen *Nicotiana* species, including several strains and varieties of *N. tabacum*, were tested, under greenhouse conditions, for resistance to black shank, caused by *Phytophthora*, at the Tobacco Institute of Puerto Rico. Two *N. tabacum* varieties, Florida R. and Tobacco Institute 150 (53-A) were resistant to a certain extent, provided the plants had reached planting-out size when they were set in inoculated soil. The author suggests that *N. repanda*, because of its definite resistance to *Phytophthora* and other diseases, might prove valuable in inter-species crosses with *N. tabacum*.
891. McLEAN, R. A. 633.71-2.42  
Observations on *Cercospora* leaf spot of tobacco and the question of varietal resistance.  
*Phytopathology*, 1943, 33: 354-62, bibl. 25.  
Leaf spot of tobacco, caused by *Cercospora nicotianae*, was studied at the Tobacco Experiment Station, Oxford, North Carolina, in 1941. In all varieties the severity of the attack decreased from the bottom leaves to the top leaves. Varietal differences in susceptibility to the fungus seemed to be determined by earlier or later ripening of the lower leaves rather than by specific resistance of any of the varieties tested.
892. CLAYTON, E. E., AND OTHERS. 633.71-2.411.4  
Fungicidal tests on blue mold (*Peronospora tabacina*) of tobacco.  
*J. agric. Res.*, 1943, 66: 261-76, bibl. 14.  
The object of the experiments was, with regard to the present emergency, to find a fungicide which contains no or little copper and which, if possible, is superior to copper compounds. At the same time an attempt was made to determine on what property the fungicidal value of the spray is based. These tests on blue mould of tobacco may, therefore, have a broader significance. The effect of many oils applied both alone and in combination with copper oxide was tested. Fungicidal properties appeared to be associated with the presence of linoleic, linolenic, oleostearic, and licanic glycerides. Protection seemed to be effected by numerous oil globules in the intercellular spaces of the sprayed leaves. Such oil-containing leaves resisted the invading fungus in the same way as leaves of resistant varieties. A mixture of fungicidal oil with copper improved the result, while copper oxide alone was ineffective. Still better results were obtained with benzyl salicylate mixed with 1% oil and bismuth salicylate without oil. Both salicylate sprays have shown superior disease control and have also given prolonged protection. The ability of a spray to inhibit spore germination was found to be no measure of its fungicidal value. Plants that are grown shaded or in the greenhouse are less effectively protected by spraying than plants growing in the open, exposed to bright sun.
893. CLAYTON, E. E., AND STEVENSON, J. A. 633.71-2.42  
*Peronospora tabacina* Adam, the organism causing blue mold (downy mildew) disease of tobacco.  
*Phytopathology*, 1943, 33: 101-13, bibl. 22.  
Discussion of identity of the blue mould of tobacco.  
SMITH, H. H. 633.71  
Studies on induced heteroploids of *Nicotiana*.  
*Amer. J. Bot.*, 1943, 30: 121-30, bibl. 18.  
McKINNEY, H. H. 633.71-2.8  
Studies on genotypes of tobacco resistant to the common-mosaic virus.  
*Phytopathology*, 1943, 33: 300-13, bibl. 9.  
KNIGHT, C. A. 633.71-2.8  
The sulfur distribution in the rib-grass strain of tobacco mosaic virus.  
*J. biol. Chem.*, 1943, 147: 663-6, bibl. 13.  
VALLEAU, W. D., AND JOHNSON, E. M. 633.71-2.8  
An outbreak of plantago virus in Burley tobacco.  
*Phytopathology*, 1943, 33: 210-9, bibl. 7.
894. BURGESS, A. H., BEARD, F. H., KEYWORTH, W. G., AND MASSEE, A. M. 633.79  
The problems and practice of hop growing. The culture, drying, diseases and pests of the hop.  
*J. Inst. Brewing*, 1943, 49: 118-39.  
(I) BEARD, F. H. 633.79  
Hops: their varieties and cultivation, pp. 118-25.  
The average yield of hops over the whole country is now 12-14 cwt. per acre, but the best growers will reach 20 cwt. and more. In the discussion of soil conditions it is emphasized that deep loams overlying a porous subsoil are the most suitable soils. An account is given of the work done by the South-Eastern Agricultural College, Wye, and the East Malling Research Station in the production of new varieties, and our present knowledge on the following subjects is summarized: Systems of training, distance of planting, dressing, pulling, training, stripping, cultivating and manuring. The results of the latest, partly unpublished, research have been taken into consideration.  
(II) BURGESS, A. H. 633.79-1.563.2  
Hop drying, pp. 125-8.  
The changes taking place in the cones during ripening are noted. The description of the process of drying embodies the results of experiments carried out at the Institute of Brewing Experimental Kilns, Beltring, Paddock Wood. Formulae are given (1) for calculating the depth to which hops should be loaded in the kiln, (2) for the amount of sulphur to be burnt. Suitable temperatures and the correct moisture content are indicated, and it is demonstrated how to calculate the time required for drying a load of hops. Finally, instructions on cooling are given.  
(III) KEYWORTH, W. G. 633.79-2.3/4+2.8  
Diseases of the hop, pp. 128-35.  
In a review of recent progress Keyworth records present knowledge on the most important hop diseases, old and new, both of fungus and virus origin, and describes measures for their control. The following diseases are dealt with: Mould, downy mildew, *Verticillium* wilt, nettlehead, mosaic, split leaf blotch and fluffy tip. Diseases of more local importance such as canker, *Armillaria*, root rot, and chlorotic disease are also briefly mentioned. Photos illustrate the devastation caused by *Verticillium* wilt.

- (IV) MASSEE, A. M. 633.79-2.7  
**Insect pests of the hop**, pp. 136-9.  
 The habits of hop-damson aphids, red spider, strig maggot, flea beetle, shy bug and the common earwig are described and measures for their control recorded. The following insects are mentioned as likely vectors of virus diseases: hop-damson aphids, rose-leaf hopper, green-leaf hopper, hop frog hopper, hop flea beetle, red spider, and rose thrips.
895. HATTON, R. G., BEARD, F. H., AND SALMON, E. S. 633.79  
**New varieties of hops.**  
*Agriculture*, 1943, 50: 187-9.  
 From crosses between European and American hops at Wye and field tests at East Malling 5 new hop varieties have emerged, every one of them richer than the ordinary varieties. The new varieties tolerate mosaic virus and should, therefore, not be planted nearer than one mile to Goldings and other susceptible types. The names of the new varieties described are: Brewer's Favourite, Quality Hop, Fillpocket, Brewer's Gold, Bullion Hop. [For fuller descriptions the reader should see an article by the same authors in *J. Inst. Brewing*, 1943, 49: 29-33; *H.A.*, 13: 488.]
896. KEYWORTH, W. G. 633.79-2.411  
**A *Phytophthora* disease of the hop in Great Britain.**  
*Gdnrs' Chron.*, 1943, 113: 238, bibl. 2.  
 A disease new to hops in Great Britain, resembling *Phytophthora cactorum*, was discovered on three farms in the south-eastern area in 1942. It is characterized chiefly by a wilting and death of the bine accompanied by a rotting of the cortical tissues and a brown discoloration of the roots, stock and bases of the bines. The disease can thus be distinguished from *Verticillium* wilt, where the wood is a homogeneous light brown colour which extends the whole length of the bine.
897. LINKE, W. 633.79  
**Der Hopfenbau. Eine Anleitung für Praxis und Unterricht über Anbau, Pflege, Schädlingsbekämpfung und Ernte. (Hop growing. Practical instructions on cultivation, pest and disease control and harvesting.)**  
 P. Parey, Berlin, 1942, pp. 239, RM. 6.40, from review *Phytopath. Z.*, 1943, 14: 394-5.
898. MIÈGE, E. 633.842  
**La culture de la niora. (Cultivation of capsicum.)**  
*Fruits Primeurs*, 1942, 12: 140-2.  
 Notes are given with special reference to Morocco on capsicum as grown in the various European and North African countries, which cultivate it commercially. Methods of cultivation and preparation of the fruits for market in Morocco are described. The crop is sufficiently profitable there to become increasingly grown and it tends to draw labour from the citrus and cotton harvests. Wartime restrictions have had to be imposed limiting the area cultivated.
899. NICOLAISEN, W. 633.85  
**Über deutsche Ölsaaten, mit besonderer Berücksichtigung des Rapsanbaues. (German oilseeds, with special reference to rape cultivation.)**  
*Fette u. Seifen*, 1942, 49: 1-4, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 79.  
 The cultivation of rape has gained in importance since breeders succeeded in raising strains with almost non-splitting pods. This will make complete mechanization of the harvest possible and facilitate drying. Cultivation and harvest of rape are discussed and poppy, white mustard and safflower are mentioned as promising oilseeds.
900. SCHROPP, W. 633.853.55-1.8  
**Ernährungsphysiologische Versuche an Rizinus. (Physiological trials on the nutrition of the castor oil plant.)**  
*Tropenpfl.*, 1941, 44: 289-303, abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 79.  
 At Weihenstephan the effect on the castor oil plant of nutritional deficiencies and of different fertilizers was studied. Increased applications of nitrogen gave an increased yield of high class seed. Ammonia gave better results than nitrates. In sand cultures superphosphate, basic slag, and Rhenania phosphate were equally efficient, whilst basic slag was inferior in highly calcareous loess loam soils. Magnesium phosphate proved very successful in one test. 50% potash salts and potash sulphate gave better results than 40% potash salts and kainit, especially with increased potash applications. Apparently the castor oil plant is susceptible to increased applications of chlorine.
901. BOX, M. M., AND SERRANILLOS, M. G. 633.859  
**Contribución al estudio del opio en España. (The study of opium production in Spain.)**  
*Bol. Inst. nac. Invest. agron.*, 1942, No. 7, pp. 201-12, bibl. 18.  
 Trials indicate that the cultivation of the opium poppy (*Papaver somniferum*) should be possible without irrigation in central Spain. In the trials on unmanured land a yield of about 8 lb. opium per acre, with a morphine content of 7.821%, was obtained. The addition to the soil of superphosphate of lime and sulphate of potash had little effect.
902. ANON. 633.88  
**Kroatien. ([Herb-growing] in Croatia.)**  
*Dtsch. Heilpfl.*, 1943, 9: 32.  
 Exports of official herbs from Croatia went chiefly to the United States and Great Britain. Although a large proportion of the population used to rely on collecting herbs for their livelihood, this activity ceased after the outbreak of war. The German authorities hope to organize herb collecting again for the benefit of the European market, when conditions in Yugoslavia allow of such activities. In 1941 more than 10,000 kg. of sage oil were distilled by the crudest methods.
903. REGEL, C. 633.91+633.87  
**Beiträge zur Kenntnis von mitteleuropäischen Nutzpflanzen. IV. Organisationsprobleme im Osten. (Economic plants of Central Europe. IV. Problems of organization in the East.)**  
*Angew. Bot.*, 1942, 24: 465-84.  
 Part IV of the series deals with the organization of agriculture and agricultural research in Eastern Europe. The production of rubber being the main concern, *Taraxacum kok saghyz* is discussed at some length. The salt-bearing soils of Rumania, the Dobruja and Bessarabia are prospective districts for cultivation and it is thought that 20,000 tons of rubber a year could be obtained from fallow lands there. Breeding improved varieties would give better results still. Two to three kg. of seeds are required for one ha. Trials in the Carpathian Mountains with another rubber plant, *Scorzonera tau saghyz*, are recommended. In the marshy lowlands of the Danube *Solidago* species should be tested. The roots of the shrub *Euonymus verrucosa*, common in Rumanian forests, provide gutta-percha and 560 kg. a year could be produced from one ha. of wild growing shrubs. Rumania could contribute large amounts of tanning substances if the roots of *Statice* species and *Polygonum alpinum* as well as the leaves of the sumach (*Cotinus coggygia*) were collected. Sumach might usefully be cultivated for the purpose.



904. LEVITT, J., AND HAMM, P. C. 633.913-1.531

A method of increasing the rate of seed germination of *Taraxacum kok-saghyz*.

*Plant Physiol.*, 1943, 18: 288-93.

The germination of *Taraxacum kok-saghyz* was stimulated by allowing the seeds to absorb water in quantity insufficient to induce germination and by drying them afterwards. The optimum conditions were soaking in a concentration of M/2 for  $\text{KNO}_3$  or M for dextrose, and drying for 14 days at  $10^\circ\text{C}$ . Nature of the solute (if thoroughly washed off) and its pH (in the case of  $\text{KNO}_3$ ) and light were factors which did not influence the stimulating effect of the treatment.

905. REDER, R., ASHAM, L., AND EHEART, M. S.

635.12: 631.8: 577.16

Effect of fertilizer and environment on the ascorbic acid content of turnip greens.

*J. agric. Res.*, 1943, 66: 375-88, bibl. 34.

At Norfolk and Blacksburg, Va, Stillwater, Okla., and Experiment, Ga, investigations were carried out to determine the effect of fertilizer and environment on the ascorbic acid content of turnip greens. In all 4 experiments the influence of place was nearly 14 times as great as the most important average effect of fertilizers. The highest ascorbic acid content of 3 spring crops was found in greens which had the least rain and the most sunshine, whilst bad weather conditions had an adverse effect. To a certain extent ascorbic acid formation is also influenced by fertilizers, the most consistent effect obtained being the decrease of ascorbic acid following potassium treatment. Nitrogen gave both increases and decreases at different places, but the decrease of the 4 places combined was significant, and the interaction of N treatment  $\times$  places was regarded as highly significant. So were the increasing effects of P treatment  $\times$  places and of NP treatment  $\times$  places. Calcium gave no significant results. The application of NCA resulted in a significant decrease for the combination of the 4 places. The authors believe that there is also a seasonal effect, in so far as autumn crops seem to be richest in ascorbic acid, but this conjecture could not yet be proved conclusively.

906. CRANE, M. B. 635.12 + 635.34/36

The origin and relationship of the *Brassica* crops.

*J. roy. hort. Soc.*, 1943, 68: 172-4, bibl. 4.

The genus *Brassica* can be divided into 3 groups according to their chromosome number. Group I (= 18 chromosomes) 9 kale varieties, cabbages, cauliflowers, broccoli, brussels sprouts, savoy, rosette colewort, kohlrabi. Group II (= 20 chromosomes) turnip rape, turnips. Group III (= 38 chromosomes) 3 kale varieties, swede rape, swedes. It is thought that the yellow turnip owes its origin to a variation in the 20 chromosome group and not to a crossing with swedes, as is frequently assumed. There is free fertility within the groups and high sterility between them, a fact which is highly important to the grower of pure seed.

907. BROWN, P. H. 635.13

Commercial carrot production.

*Occas. Publ. sci. Hort.* 4, 1943, pp. 24-8.

Important points stressed are, the choice of the right type of soil, which should be light, cool and friable, clean land, and the need for potash. A light harrowing to destroy weeds given a week after sowing will save trouble later. Salt, 4 cwt. per acre, is said to increase yield and suppress weeds. As a wartime measure bunching may be dispensed with and the green tops returned to the land. The farm methods of weed control, wider spacing of rows and thinner sowing are more profitable than the more intensive garden methods. There is much other useful information.

908. SCHUPHAN, W.

635.13-1.523

Biochemische Sortenprüfung an Gartenmöhren als nezeitliche Grundlage für planvolle Züchtungsarbeit. (Biochemical tests of carrot varieties as a basis for planned breeding.)

*Züchter*, 1942, Vol. 14, Heft 2, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 81.

The carrot and sugar contents of 13 carrot varieties were studied. Early carrots in late cultivation were found to have the highest carotene content. The outer portion of the carrot contained more carotene and disaccharides than the centre part. "Lange rote stumpfe ohne Herz" was superior to all other varieties in yield and carotene content.

909. WOODMAN, R. M.

635.13: 631.8

The nutrition of the carrot.

*Ann. appl. Biol.*, 1943, 30: 1-7, bibl. 5.

The work was carried out at the Horticultural Research Station, Cambridge. In sand-culture experiments with carrots, it was shown that a moderate quantity only of nitrogen was necessary for optimum growth compared with for example, the turnip root. A moderate amount of (available) phosphorus was also sufficient for this purpose, as with the turnip, but contrary to experience with lettuce roots and tops. The greatest concentration of potassium applied, however, was probably the best for root development. Deficiency of phosphorus caused bronzing of the leaves, and absence of potassium serious scorch; absence of boron resulted in a small, immature plant. Initial field trials on an old river gravel during experiments throughout the last 7 years indicated that dung gave no advantage over artificials, that artificials were possibly not needed on dunged land or land in good heart, and that land out of good heart, undunged and unfertilized throughout the 7 years, responded well to artificials, particularly phosphate and potash. The incidence of carrot fly [which], according to preliminary experiments, [was most pronounced on dunged and artificially manured plots,] seemed to depend greatly on the nutrition of the carrots. [Author's summary.]

910. THOMAS, H. R.

635.13: 632.48

*Cercospora* blight of carrot.

*Phytopathology*, 1943, 33: 114-25, bibl. 15.

*Cercospora carotae* attacks leaf blades and petioles of the cultivated carrot and various *Daucus* species. No marked resistance to the disease was found among 112 carrot varieties, selections and *Daucus* species tested in the field in California. The most favourable temperature for growth is between  $19^\circ\text{C}$ . and  $28^\circ\text{C}$ . The fungus is sufficiently persistent in the soil to attack successive crops and is also wind borne. Viable conidia have been found on the seed. Treatment of seed artificially infected with conidia was effective, the successful agents being ethyl mercury phosphate, and ethyl mercury tartrate either as a liquid (1-24,000) or a dust, mercuric chloride (1-1,000) and Spergon.

911. MOUNCE, I., AND BOSHER, J. E. 635.13: 632.48

Seedling blight of carrot caused by *Alternaria radicina*.

*Sci. Agric.*, 1943, 23: 421-3, bibl. 8.

The disease, a black rot of stored carrots in U.S.A., is now reported as a seedling blight in N. America for the first time, though known as such in Europe for some years. It is easily controlled by seed treatment with the disinfectants commonly used.

912. MOYSE, W. J.

635.25

The cultivation of onions.

*Occas. Publ. sci. Hort.* 4, 1943, pp. 29-33.

The paper discusses the extension of home production of onions, points in successful production, onion growing in Bedfordshire, including harvesting and storage, and the production of onion seed.

913. GILES, W. F. 635.25/26  
Onions and other edible Alliums.  
*J. roy. hort. Soc.*, 1943, 68: 193-200.  
The origin and properties of certain *Allium* species, namely onions, tree onions, potato or underground onions, Welsh onions, scallions, leeks, sand leeks or romanesco, shallots, garlic, and chives are described.
914. WALLACE, T., CROXALL, H. E., AND PICKFORD, P. T. H. 635.25: 631.8  
Manurial experiments on vegetable crops. III. Effects of farmyard manure and of various fertilizer treatments on onions.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 32-3, bibl. 1.  
In this onion manurial trial, which was hampered by complete failure of germination at the first sowing and very poor germination at the second, only Red Wethersfield producing enough plants to continue the trials, the phosphate omitted and farmyard manure plots were the only ones to show significant increases of yield, the former over three other treatments and the latter only over one, i.e. nitrogen omitted. There were indications that chloride-containing fertilizers do not injure onions. There was a noticeably low percentage of good onions on the nitrogen only plots.
915. YARWOOD, C. E. 635.25: 632.411.4  
Onion mildew.  
*Hilgardia*, 1943, 14: 595-691.  
Onion mildew caused by *Peronospora destructor* Berk. is the most destructive disease of seed onions in California. Damage is principally due to seed stalk infections, as defoliated plants yield about as well as plants with normal foliage. Attempts to culture *P. destructor* in vitro from sporangia were unsuccessful, but the addition of  $\text{KMnO}_4$ , glycine, and extracts of *Phytophthora citrophthora* to agar cultures greatly increased the length of the germ tubes. The principal method of oversummering of *P. destructor* is by means of mycelium in the bulbs to be used for the seed crop. The growth of the organism under different conditions was studied. Sulphur and malachite green sprays were more effective than copper sprays in reducing sporulation on leaves. The addition of vegetable oils or sardine oil increased the protective value of copper sprays. Field control was secured from dilute and vapour dust sprays but not from dry dust applications. Rosin lime-sulphur spray applications increased yield of seed by as much as 5,700%.
916. KEARNS, H. G. H. 635.25-632.954  
A small acid spray outfit for spraying onion beds.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 77-82, bibl. 3.  
The outfit, which is described and illustrated, consists of a 12-gallon tank, a pump, delivery hose and a spray broom which permits three rows of onions to be sprayed at a time. About 1 acre can be sprayed in the day.
917. FAGAN, T. W., PHILLIPS, R., AND DAVIES, R. O. 635.347  
The cultivation and composition of kale.  
*Welsh J. Agric.*, 1943, 17: 97-101.  
The cultivation of the two kale varieties, Marrow Stem and Thousand Headed, now important for winter feeding, is described and tables are given of their chemical composition for several sowing dates.
918. HENNING, P. D. 635.347  
Kale.  
*Fmg S. Afr.*, 1943, 18: 255-8.  
Among the directions for the cultivation of kale it is reported that moderately stripped plants gave on an average 53% more yield than severely stripped plants.
919. WALLACE, T., CROXALL, H. E., AND PICKFORD, P. T. H. 631.8: 635.34 + 635.13  
Manurial experiments on vegetable crops. IV. Effects of farmyard manure and other manurial treatments on spring cabbage and carrot crops.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 34-7, bibl. 1.  
Manurial trials on spring cabbages and carrots following savoy and early potatoes [for trials on the last two see *Ibidem* for 1941, p. 33; *H.A.*, 12: 928] are described. Results on spring cabbage show the paramount need for nitrogen. All manurial treatments produced high yields of carrots, but further deductions were rendered of doubtful value by the fact that there was unexpectedly a sharply marked division in both germination and growth conditions on the west and east halves of the experimental area.
920. AHLBERG, O. 632.77: 635.34 + 635.13  
Bekämpningsförsök mot kållflugor och morötflugor. [Experiments on the control of cabbage flies and the carrot fly.]  
*Växtskyddsnotiser*, 1942, No. 6, pp. 84-8.  
Cabbage flies occur throughout the whole of Sweden up to the most northerly part of Norrland, as far as it is possible to grow cabbages and carrots in the open. They have hitherto been controlled with excellent results by watering the young plants with sublimate, which is, however, relatively expensive. Against carrot fly attack for the most part paraffin emulsion has been employed; this is not quite reliable in its effect and is stated to affect the taste of the carrots. This year (1942) experiments have been initiated in the vicinity of Luleå and Skellefteå and also at Idre in the most northerly part of Dalarna in which the effect of crude naphthalene, calomel powder, fruit tree carbolineum, three different arsenic salts and pyroligneous acid has been investigated. Crude naphthalene and calomel were used in the dry state while water was added to the other remedies; the soil immediately around the plants was then watered. The results of these trials were quite promising, at least as regards crude naphthalene and calomel powder. Crude naphthalene appears to have been particularly effective against the carrot fly. Fruit tree carbolineum may also possibly have a good effect. These three remedies will therefore be included in subsequent trials, when different methods of distribution and different concentrations will be tested.
921. BARRONS, K. C., AND WHITAKER, T. W. 635.52  
Great Lakes, a new head lettuce variety adapted to summer conditions.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 25: 252-4.  
The new lettuce variety Great Lakes was tested at the Michigan Agricultural Experiment Station, East Lansing. It was found to withstand higher temperatures than other varieties without tip-burn or development of seed stalks. The chief criticism of the variety is "ribbiness", i.e. mid-ribs of the outer leaves of the head which sometimes protrude enough to give the head a poor appearance and cause difficulties in packing.
922. ZILLIG, H. 635.54  
Die Zichorie (*Cichorium intybus*) als Salatpflanze. (Chicory as a salad plant.)  
*Gartenbauwiss.*, 1942, 16: 709-22, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 81.  
In order to bridge the salad gap of the winter the author advocates the growing of chicory in viticultural districts and describes its culture.



923. PIERCE, E. C., AND STODDARD, D. L. 635.611: 631.8  
Some effects of sand and nutrient supply on a physiological leaf spot of cantaloupe.  
*Phytopathology*, 1943, 33: 162-4.  
Coarse sand proved a more successful medium than fine for cantaloupe plants grown in nutrient solution.

924. WALKER, M. N. 635.615: 581.162.3  
A useful pollination method for watermelons.  
*J. Hered.*, 1943, 34: 11-3, bibl. 1.  
To facilitate operations in the artificial cross-pollination of water melons for selection and other purposes in Florida a small blossom cage was constructed of wire covered with white cloth, the wire on one side being extended to anchor the cage to the ground against wind injury. Blossom bags made of paper or cloth without the frame were liable to damage the flower. The cost of construction was from 10 to 12 cents but a cage would last 5 years without re-covering. Pollination is done on the morning of the day following bagging of males and females. The male blossom is picked from the vine and its petals removed with blunt-tipped forceps. After pollination the cage that covers the male flower is placed on top of the labelling stake beside the female flower as an indication that the flower has been treated and is picked up after the work is over. The labelling routine is modified to indicate at a glance whether the flowers have been selfed or crossed. It has been found unnecessary to ensure very close contact between the lower edges of the cage and soil to avoid contamination since bees, practically the only agent for outside pollination, always approach from above. Female blossoms previously pollinated by any outside agency could be detected by the adhering pollen grains.

925. CORBETT, W. 635.64  
The cultivation of tomatoes in the open.  
*Occas. Publ. sci. Hort.*, 4, 1943, pp. 34-7.  
Plants are raised under glass in March and should be out by the first week in June. Normal spacing is 3 ft. to 4 ft. in the rows, 18 in. between plants. Double rows have several disadvantages chiefly connected with cultivation and proper spraying. Wind protection, e.g. hop lewning round the plot or at 30 yds. interval across the plot, is necessary on exposed sites. The best method of support is stringing from the base of the plant to a wire stretched on stakes along the rows. In fine seasons stopping should be regulated by time, i.e. in the second week in August and not by the number of trusses. When stopping, leave two leaves above the last truss which has half set. Trusses just coming into flower are useless. Blight (*Phytophthora infestans*) can be completely controlled by spraying with bordeaux mixture; dry spraying is easier and quicker than wet and can be applied when the fruit is wet. The present manuring allocation of 2 cwt. muriate of potash per acre should be applied before planting together with 5 cwt. of hoof and horn meal, or 7 cwt. meat and bone meal. Under good conditions an average yield should be 15-20 tons per acre.

926. BARRONS, K. C., AND APPLE, S. B. 635.64  
An inexpensive method of growing tomato plants on the farm.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 25: 229-35.

The construction of a frame at low cost is described suitable for growing tomato plants as cheaply in Michigan as they can be introduced from the Southern States. Stakes are set in the ground at intervals of about 45 in. in two parallel rows 6 feet apart. On them are nailed boards and 4 foot lath and manure is stacked along the outside. A continuous piece of 81 in. unbleached muslin sheeting covers the frame. Height of the N. or W. side 24-30 in. and of the S. or E. side 18-24 in. Calculating expenses and labour the cost of home-grown plants per thousand will hardly, if at all, exceed the price of southern plants. Home-grown plants,

however, gave an almost 20% higher yield per acre than southern plants, even after the stand of the latter had been corrected to 100%. There were no losses after transplanting of home-grown plants.

927. HARGRAVE, P. D. 635.64  
Tomato varietal yield tests.  
*Sci. Agric.*, 1943, 23: 322-6, bibl. 2.  
A tomato trial has been in progress at the Brooks Provincial Horticultural Station, Alberta, each year since 1937. In 1938 a co-operative trial was carried on with the North Dakota Experiment Station, U.S.A. In Alberta the chief requirement is not so much a high total yield as an ability to ripen a high percentage of fruit. Farthest North, which potentially is such a variety, has too small a fruit. Hyb. B.V.5, a selection from Farthest North  $\times$  Burbank, should be a success in home gardens but the fruit is too small for commercial purposes. A Morden selection of Bounty and smooth selections from Bison are suitable for commercial production and are proving popular.

928. ADAMSON, R. M. 635.64  
The determinate tomato and its relation to prairie horticulture.  
*Sci. Agric.*, 1943, 23: 265-72, bibl. 8.  
Determinate tomato varieties produce relatively short vines with sparse foliage, and fruits well exposed to the sun and do not require pruning and staking. Comparative trials between some of these and indeterminate, heavy vined varieties (normal type) were carried out at Morden Experiment Station, Manitoba, and at North Dakota Experiment Station, U.S.A. In general the determinate vined varieties produced a smaller, more compact plant than the indeterminates but the fruit was often rough or undersized. Varieties Bounty, Victor and Firesteel, however, produced fruits averaging 4.5 oz. or over which is an acceptable size in Canada. The early determinates (total yield for the first 2 weeks of harvest) were on the whole earlier than the early indeterminates and determinate varieties significantly outyielded the indeterminates when neither was pruned or staked.

929. MAHER, F. A. 635.64  
"Tatura Dwarf Globe" tomato. Select and save your own seed.  
*J. Dep. Agric. Vict. Aust.*, 1943, 41: 78-9.  
The "Tatura Dwarf Globe" tomato variety, released by the Department of Agriculture during 1941, shows great promise and appears likely to replace the standard canning varieties in Victoria, particularly in the Goulburn Valley district. Its characters are described in notes on how to select plants for seed.

930. BOWSER, P. H. 635.64  
The Early Chatham tomato.  
*Quart. Bull. Mich. agric. Exp. Stat.*, 1943, 25: 245-8.

The Early Chatham is an extra early variety of tomato introduced by the Upper Peninsula Experiment Station for areas of short growing seasons.

931. GLEDITSCH, E., AND GRAF, T. 635.64: 546.791  
De radioaktive stoffers innflytelse på plantenes utvikling. (The effect of radio-active substances on development of plants.)  
*Nord. Jordbr.Forsk.*, 1942, 24: 225-36.

After reviewing earlier researches the authors describe their own investigations at Blindern, Oslo, with ten tomato plants of the variety "Dansk Eksport". The plants, which were as similar as possible, were planted two by two in five boxes, each box with 20 kg. soil. The first box contained the control plants, the others the experimental plants; here the soil was mixed with a radio-active mineral, a carnotite with 2% uranium and approximately 5.5 mg. radium per ton. The concentration of uranium in the boxes was: 0, 2, 8, 32 and 128 g. uranium per ton of soil in each box respectively.

A few weeks after planting it was evident that the plants in boxes 4 and 5 were the largest and best developed. They also flowered first, 25 and 26 June.

Tabulated data show that the first picking of ripe tomatoes and the heaviest and largest occurred two to three weeks earlier for plants 3, 4 and 5 than for control.

In these experiments the number of plants was too small for the variation in yield of tomatoes in proportion to the concentration of uranium to be determined with certainty. The mixture in box 3, however, with 8 g. uranium per ton soil, seems to have been most successful and the yield in this instance has been the largest. Plants which received still larger quantities of uranium gave approximately the same yield as the control plants, but slightly less than plants in box 3. It is hoped to initiate experiments on a larger scale.

932. ŠKOK, J. 635.64: 581.19

Defoliation of tomato plant as a response to gaseous emanations from the fruit.

*Bot. Gaz.*, 1943, 104: 486-9, bibl. 8.

It is suggested that a gaseous emanation, probably ethylene, causes defoliation of tomato plants. Young plants drop their leaves in the presence of ripe fruits, whereas the foliage of old plants remains healthy if fruits are removed in the green state. Nutrition experiments exclude lack of supplies during the later growing period as a possible cause for defoliation.

933. GOTTLIEB, D. 635.64: 632.48

The presence of a toxin in tomato wilt.

*Phytopathology*, 1943, 33: 126-35, bibl. 20.

By the use of a centrifuging method and apparatus devised by the author at the University of Minnesota for collecting anaerobically the tracheal fluids of plants it was found that a toxin is present in the tracheal fluids of tomatoes showing fusarium wilt and that the active constituent is associated definitely with the presence of the fungus *Fusarium bulbigenum* var. *lycopersici*. By this method no toxins were found in plants wilted by lack of sufficient soil water, which is not the case when expression of sap under aerobic conditions is the method used. The author considers his centrifuging technique should prove useful in the study of vascular parasites in which toxins are suspected, e.g. in Dutch elm disease, since the tracheal fluids can be obtained with a minimum admixture of cell sap and with relatively little chemical change.

934. WELLMAN, F. L. 635.64: 632.48

Increase of pathogenicity in tomato-wilt *Fusarium*.

*Phytopathology*, 1943, 33: 175-93, bibl. 17.

A study was made of the tomato-wilt fungus, *Fusarium bulbigenum* var. *lycopersici*, relating to the change in its virulence as well as to the relative hardiness and comparative competitive capacities of its virulent and mild types. The thermal deathpoint of conidia from virulent isolates at 60° C. ranged about 10° C. higher than the death point of conidia from mild forms. In 2-2½-year-old cultures more conidia germinated from virulent than from mild strains. Subcultures from such surviving conidia of the mild type turned out to be more pathogenic than young mild cultures. Although on agar the mild type grew faster than the virulent, the latter predominated where there was competition, in a liquid medium or on the host. Variation towards mildness or virulence did not tend to be permanent; changes in virulence were, therefore, concluded to be an adaptive variation rather than a mutation. Adaptation towards increasing virulence may follow prolonged culture of resistant tomato varieties in infested soils. The occasional occurrence of severe wilt losses among resistant varieties could be accounted for by a virulent form gradually gaining predominance over a mild form on a particular plot. Breeders of wilt resistant tomatoes should test their varieties by inoculation with the most virulent type of the fungus available.

935. BEACH, W. S., AND SHU YI CHEN (SHUK YEE CHAN). 635.64: 632.4

Experimental control of damping off in tomato seedlings transplanted from sand, including the immediate application of fungicidal drenches.

*Bull. Pa agric. Exp. Stat.* 434, 1942, pp. 26, bibl. 12.

Overconcentration of nutrient salts in sand cultures was found to be a cause of high susceptibility to damping off of tomato seedlings. If the sand was washed in hot water for every crop in order to remove an excess of soluble nutrient matter seedlings were just as resistant as those grown in steamed soil. After transplanting susceptibility to *Pythium ultimum* lasts for about three days, to *Rhizoctonia solani*, however, for a much longer period. Thoroughly drying infested soil and keeping it dry until just before transplanting very largely prevented the disease. In this way the mycelium will be destroyed and the *Pythium* spores will not be allowed sufficient time to develop fresh mycelium during the most susceptible period of the seedling. The creation of conditions favouring return to normal turgor helped to reduce susceptibility still further. Seedlings from treated soils suffered 50% less from damping off than seedlings from an untreated source. Fungicidal drenches as additional control measures may be too late for *Pythium*, but will be effective against *Rhizoctonia*. Drenches recommended against *Pythium* are, under conditions of moderate disease, copper sulphate (0.5-1 g. to the square foot), against both *Pythium* and *Rhizoctonia*, Semesan (0.25-0.5 g.), and wettable Spergon (0.7 g.), with water to dissolve or suspend these substances, 1 pint to the square foot. Early application is advisable. If drenched just after transplanting, plants should be rinsed with a limited amount of water and allowed to dry, though not in direct sunlight.

936. GREEN, E. D., AND ASHWORTH, D.

635.64: 632.411

Blight of outdoor tomatoes—spraying tests, 1942.

*J. roy. hort. Soc.*, 1943, 68: 179-83, bibl. 3.

Bordeaux mixture, Burgundy mixture, and 4 copper-containing proprietary sprays were tested at Wisley in trials on the control of tomato blight, *Phytophthora infestans*. Both mixtures and 3 of the 4 proprietary sprays gave good results without affecting the plant to any extent. The spray deposit on the fruit persists despite rain. In Surrey the first half of August seems to be the right period for giving the first spray to outdoor tomatoes. Investigations as to whether one good spraying will suffice will be carried out. The late fruits, to be ripened in store, may, however, need a later overhead spray. It was not found that seeds carry the fungus, but seeds from badly blighted plants germinate poorly.

937. WAIN, R. L., AND WILKINSON, E. H.

632.952.21: 635.64

A preliminary trial of new copper fungicides on outdoor tomatoes.

*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 56-8, bibl. 2.

In a small-scale trial on the control of *Phytophthora infestans* the following compounds were used in addition to bordeaux mixtures (0.1% Cu and 0.2% Cu): copper sebacate (23.87% Cu), and two cupric cuprimalates (31.73% and 29.09% Cu respectively). The non-appearance of blight except on one fruit in a control plot prevented an assessment of their protective value. None of them damaged either foliage or fruit. No difficulty was met in maintaining and spraying the suspensions or in obtaining a uniform cover.

938. STARR, G. H.

635.64: 632.53/59

A new parasite on tomatoes.

*Phytopathology*, 1943, 33: 257-8.

Broom rape, *Orobancha ludoviciana*, was found parasitic on one lot of tomatoes in Wyoming, reducing the yield.



939. KONOLD, O. 635.65  
Anbau von Hülsenfrüchten. (Cultivation of leguminous crops.)  
Reichsnährstand Verlags-Ges. m.b.H., Berlin, 1942, pp. 111, RM. 1.50=Arb. Reichsnährstand, 8, from review *Forschungsdienst*, 1942, Vol. 14, abstr. p. 78.

After introductory remarks on agricultural economy, agricultural botany and climatology the author deals in detail with the cultivation of peas, lathyrus, lentils, the most important *Vicia* species, lupins and soya beans.

940. RAPHAEL, T. D. 635.656  
Green pea trials. Summerless Experimental Station, 1941-2. II.  
*Tasm. J. Agric.*, 1943, 13: 150-5, bibl. 2.

Trials at Summerless Experiment Station, Tasmania, 1941-2, are discussed under the headings: cropping, maturing periods, seed characteristics and varietal data. The heaviest crop was obtained from Canadian seed of Radium with Southern Cross and Market Selection the next best. The quickest main crops to mature under exceptionally dry conditions were Resident Surprise at 104 days, Glacier at 106 and Meteor at 108. At a later sowing English Wonder and Glacier reached picking maturity in 81 days. Radium required 127 days. Culinary type peas should be tender and sweet and retain their colour after cooking and be of fairly large size. Canning peas should be uniform in size and ripening, of smaller size and with a type of pod that will respond to commercial vining machinery. Peas for splitting or crushing should have an easily detachable seed coat. Characters suggested for a reliable classification are type of growth, leaf, flower, stipule and tendrill development in regard to size, colour, position, etc., and colour, shape, size and skin marking of seeds. Some examples are given.

941. WENT, F. W. 635.656: 631.541  
Transplantation experiments in peas. III.  
*Bot. Gaz.*, 1943, 104: 460-74, bibl. 14.

The percentage of take was highest when pea seedlings were grafted 6-8 days after soaking both the seed and scion. Hormone treatment had no effect. Intermediate stems of 76 successfully double-grafted peas did not affect the growth of the scion, for the development of which only the root system and the cotyledons of the stock are thought to be responsible. In extensive experiments comprising 960 grafts a correlation between auxin content and growth rate of the scion was ruled out. The limiting factor is supposed to be caulocaine as suggested in the first paper of the series.\* Poor viability of peas upon storage is due to decreased resistance to rotting, not to leaching. After soaking, however, the growth factor content of the cotyledons is reduced. In this case leaching is the cause of bad germination. The three genetic characters Stipuleless, Acacia-leaf and Rogue are due almost wholly to changes in reactivity of the tissues.

942. CASS-SMITH, W. P., AND HARVEY, H. L. 635.656  
Legume inoculation. Tests with blue boiler peas and New Zealand lupins.  
*J. Dep. Agric. W. Aust.*, 1942, 19: 264-7, bibl. 1.

Three strains of nitrogen fixing bacteria were tested on blue boiler peas at Pickering Brook in 1942 by the West Australia Department of Agriculture. Of these that supplied by the Waite Institute, South Australia, gave a green yield at harvest some 14 times greater than the uninoculated controls. Strains from other sources gave  $3\frac{1}{2}$  and  $4\frac{1}{2}$  times greater increase. The importance of using an effective strain of bacteria is thus evident.

\* *Amer. J. Bot.* 1938, 25:44-55, H.A., 8:7.

943. BAYLIS, G. T. S., DESHPANDE, R. S., AND STOREY, I. F. 635.656: 631.531.17  
Effect of seed treatment on emergence of peas.  
*Ann. appl. Biol.*, 1943, 30: 19-26, bibl. 15.

Experiments carried out by the Imperial College of Science, London, during the early months of 4 consecutive years lead to the following conclusions: (1) High soil moisture accentuates the pre-emergence damping-off of peas. In box-sown peas under controlled conditions there appeared to be a critical period during the course of germination when high soil moisture was very deleterious, the duration of the period depending upon rate of germination, which is related to soil temperature. Postponement of watering to 3 days after sowing greatly increased emergence percentage. (2) Dressing the seed with red cuprous oxide or an organic mercurial preparation without a sticker, gives a useful measure of disease control. (3) Although cuprous oxide often gave increased emergence over the mercurial preparation the latter reduces the amount of seed-borne (*Ascochyta*) disease. (4) The presence of a growth-promoting substance in a mercurial preparation has proved ineffective. The present work supports the view that wrinkled-seeded peas are on the whole more susceptible than round-seeded to damping off. A substantial stand of field-sown peas can often be obtained during weather inimical to emergence by the simple process of dusting with certain fungicides.

944. WAIN, R. L., AND WILKINSON, E. H. 635.656: 632.4: 632.952.21  
Investigations with various copper compounds in relation to "damping-off" in peas.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 59-64, bibl. 6.

1. A number of pure copper compounds have been compared at equivalent copper concentrations as protectants for the control of "damping-off" using three varieties of pea seeds. A smaller number have been tested at equivalent weights of compound with one pea variety. 2. Copper damage occurred in one experiment only, and was caused by the copper sulphate monohydrate and copper phosphate treatments. 3. The proprietary red cuprous oxide used was inferior to several of the other compounds tested. Of these, copper sebacate was consistently good, the results suggesting that this derivative merits further examination. [Authors' summary.]

945. ANDREWS, W. B., AND BRISCOE, C. F. 631.874.2: 635.655  
The response of vetch and soybeans to strains of nodule bacteria.  
*J. Amer. Soc. Agron.*, 1943, 35: 271-8, bibl. 5.

Inoculations of soybeans and vetch with various strains of nodule bacteria suggested that an increase in yield due to inoculation indicates the effectiveness of the root nodule bacteria and that therefore nitrogen determinations are not necessary.

946. SWABY, R. J. 631.847  
Inoculation of legume seed.  
*Agric. Gaz. N.S.W.*, 1943, 54: 9-13.

The advantages of the inoculation of legume seed with nitrogen forming bacteria are discussed. The method advised is to spread the seed on a flat surface and sprinkle with a mixture made by shaking the bacterial slime with a little water. The seed is then well turned by hand or shovel so that each is covered with a film of moisture. An hour later the seed can be sown, care being taken meanwhile to shade it from direct sunlight which will destroy the organisms. Different groups of legumes require different strains of bacteria. A list of plants comprising each group is given. Adequate superphosphate and lime must be present in the soil, the requirements for legumes being two or three times those of non-legumes. The superphosphate requirements per acre for various legumes in different parts of N.S.W.

are tabulated and some advice is given on the liming treatment suitable for each district. A bacterial survey of 16 N.S.W. soils showed that none contained all seven groups of nodule bacteria, the scarcest being the bean, lupin and soybean micro-organisms. A table of crop yields showing the influence of inoculation is given. Tested cultures of bacteria are provided very cheaply by the Department of Agriculture and in view of this it is considered wise to treat all legume seed before planting.

947. BROOKS, H. E. 635.1/7  
Food production in vegetable gardens and allotments.  
*Bull. Cumberland and Westmorland Joint agric. Educ. Cttee* 5, 1942, pp. 42, 4d.  
A concise textbook on gardening for the use of allotment holders.  
WATSON, D. J., AND RUSSELL, E. J. 633.416: 631.8  
The Rothamsted experiments on mangolds 1872-1940. I. Effect of manures on yield of roots. II. Effect of manures on the growth of the plant.  
*Emp. J. exp. Agric.*, 1943, 11: 49-64, 65-77, bibls. 19 and 4.  
PUTT, E. D. 633.85  
Association of seed yield and oil content with other characters in the sunflower.  
*Sci. Agric.*, 1943, 23: 377-83, bibl. 3.

## FLOWER GROWING.

948. AHLBERG, O. 635.939.98: 632.77  
Krysantemumgallmyggan, *Diathronomya chrysanthemi* Ahlb., och dess bekämpning. (Chrysanthemum midge and its control.)  
*Medd. Stat. Växtskyddsanst.* 38, 1942, pp. 32, bibl. 36.

In 1936 the Plant Protection Institute of Sweden received some chrysanthemum plants which were severely checked in growth and seriously deformed by small wart-like gall formations both on the shoots as well as on the flower-heads and leaves. From the size and appearance of the galls it was evident that they were caused by the chrysanthemum gall midge, first observed in America and subsequently in England and Denmark. A detailed account is given of its distribution, stages of development and life history, host plants and the damage caused. The eggs are killed by spraying with a liquid containing at least 0.1% pure nicotine and 0.50-0.75% pure soap every fourth day for a period of two months. Spraying is economic, however, only so long as the plants are small. The gall midges may also be killed by HCN treatment in a concentration of 0.004% by volume. The gas treatment is repeated every night for a period of 5-6 weeks and pays with large as well as with small plants. If it is intended to take cuttings from collections of plants which have been attacked, they should not be selected from the green shoots which had emerged from the mother plants before the completion of cultivation; these should be removed and instead cuttings should be taken from the shoots which emerge later. Cuttings obtained from other growers should be kept under careful observation for at least a month in a separate house.

949. SEVERIN, H. H. P. 635.936.751: 632.8  
Susceptibility of perennial delphiniums to *sfx* viruses.  
*Hilgardia*, 1942, 14: 549-70.

Perennial delphinium has been proved to be infected with tomato spotted wilt in nature. This disease ranks next to aster yellows as a serious disease in the central-coastal regions of California. Delphinium has been demonstrated to be naturally infected with a virus complex including spotted wilt and celery calico. Varieties and hybrid

- PUTT, E. D., AND UNRAU, J. 633.85  
The influence of various cultural practices on seed and plant characters in the sunflower.  
*Sci. Agric.*, 1943, 23: 384-98, bibl. 2.

- WITHROW, A. P., WITHROW, R. B., AND BIEBEL, J. P. 635.41: 612.014.44  
Inhibiting influence of the leaves on the photo-periodic response of Nobel spinach.  
*Plant Physiol.*, 1943, 18: 294-8, bibl. 9.

- SINNOTT, E. W., AND FRANKLIN, A. H. 635.62: 581.192  
A developmental analysis of the fruit in tetraploid as compared with diploid races of cucurbits.  
*Amer. J. Bot.*, 1943, 30: 87-94, bibl. 10.

- RAINIO, A. J. 635.63: 632.8  
Untersuchungen über Cucumis-Virus I, Erreger der Kräuselkrankheit auf Gurkenpflanzen. (Studies on the cucumber virus I, causing leaf curl of cucumber plants.)  
*Valt. Maatalousk. Julk.*, No. 109, pp. 24, from abstract *Forschungsdienst*, 1942, Vol. 14, abstr. p. 76.

- EVANS, A. C. 632.765  
Value of the pF scale of soil moisture for expressing the soil moisture relations of wireworms.  
*Nature*, 1943, 152: 21-2, bibl. 4.

delphiniums have been experimentally infected with common cucumber mosaic and western cucumber mosaic. The type of infection was systemic. Delphiniums were experimentally infected with tobacco ringspot and ordinary tobacco mosaic. The type of infection was systemic with tobacco ringspot and local with ordinary tobacco mosaic.  
H.H.P.S.

950. SEVERIN, H. H. P. 635.936.751  
Leaf variegations of perennial delphiniums.  
*Hilgardia*, 1942, 14: 571-82.

Golden-leaf and silver-leaf variegations are non-transmissible by juice or insect inoculations and are seed-borne. They are not virus diseases.  
H.H.P.S.

951. SEVERIN, H. H. P. 635.936.751: 632.8  
Viroses of annual larkspurs.  
*Hilgardia*, 1942, 14: 583-94.

Annual larkspurs are naturally infected with many virus diseases, in a few of which the identity of the virus has been determined, such as California aster yellows, celery calico, and curly top. Annual larkspurs were experimentally infected with western cucumber mosaic.  
H.H.P.S.

952. NOGGLE, G. R., AND WYND, F. L. 585.94: 631.8: 577.16  
Effects of vitamins on germination and growth of orchids.  
*Bot. Gaz.*, 1943, 104: 454-9, bibl. 36.

Seeds of the hybrid *Cattleya trianae* var. *mooreana* × *C. schroederiae* were sown in a medium of purified maltose plus various additions. Of all the added materials tested only nicotinic acid (P-P factor) gave good results on germination and development of seeds.

953. WHEETING, L. C. 635.937.34: 631.544  
Soil management for roses in the greenhouse.  
*Bull. Wash. agric. Exp. Stat.* 421, 1942, pp. 20, bibl. 4.

The development of yellow or mottled foliage has been the source of serious losses to growers of Talisman roses in the Pacific North-west. Studies of the cause of the trouble were made at the Agricultural Experiment Station, Pullman.



Continued use of hard water raised the pH value to 8.5 and above and reduced the amount of available iron in the soil. This accounts for the yellow leaf colour regardless of the time of year and the presence of other nutrients. The use of fertilizers which leave acid residues in the soil or applications of sulphur are, therefore, recommended. In order to maintain the pH value at the optimum of 6.8 and to obtain a maximum yield, nitrogen, phosphorus, and potassium should be supplied in a ratio 2-2-4.

954. CALDWELL, J., AND PRENTICE, I. W.

635.944:632.8

An investigation into the "stripe" disease of narcissus. II. Experiments on the virus agent and its spread.

*Ann. appl. Biol.*, 1943, 30: 27-32, bibl. 7.

Transmission of stripe disease of narcissus was obtained by grafting and by juice inoculation with the use of an abrasive. It is not seed-transmitted. Transmission in the field occurs above ground and not through the roots. The vector is as yet unknown. Infected bulbs flowered later but not less than clean bulbs and increased in bulk-size more slowly. Roguing is an effective control.

955. NELSON, R.

635.944

Influence of bulb treatments on growth and flowering of the Easter Lily.

*Quart. Bull. Mich. agric. Exp. Stat.*, 1942, 25: 105-20.

A series of experiments were carried out at the Agricultural Experiment Station, East Lansing, Michigan, from 1935 to

1942 in order to discover a bulb treatment which would stimulate early flowering and at the same time prevent root and bulb rots. Dipping the roots in a suspension of 1 lb. of wettable sulphur in 1 gallon of water had the desired effect while other fungicides tested were either harmful to the plant or, as formaldehyde, had no generally beneficial effect. The sulphur treatment stimulated earlier rooting, advanced germination, and resulted in a more vigorously growing plant. Root rot was controlled and flowers appeared 5-10 days in advance of plants from untreated bulbs.

956. HARTZELL, A.

635.976.84:632.77

Biology of the holly leaf miner (*Phytomyza ilicicola*)

*Contr. Boyce Thompson Inst.*, 1943, 13: 17-27, bibl. 28.

HARTZELL, A., COLLINS, D. L., AND BLAUVELT, W. E.

Control of the holly leaf miner.

*Contr. Boyce Thompson Inst.*, 1943, 13: 29-33, bibl. 4.

FRIEND, W. H.

635.9

Plants of ornamental value for the Rio Grande Valley of Texas.

*Bull. Tex. agric. Exp. Stat.* 609, 1942, pp. 156, bibl. 13.

## CITRUS AND SUB-TROPICALS.

957. (SWINGLE, W. T.)

634.3

The citrus family.

*Science*, 1943, Vol. 97, No. 2511, suppl. p. 8.

A note on Swingle's revision of the *Citrus* family, the first complete re-examination since 1824, shortly to be published in monograph form by the California University Press. Under the new arrangement the family consists of 33 genera. A technique for examining flowers and buds is described as giving far more accurate results and being more economical of material than the ordinary method. Single flowers or buds are embedded in paraffin and sliced into transparently thin specimens for microscopic examination. Thus one specimen may be multiplied into a great number. Swingle has accumulated more than a quarter of a million of such microscope-slide specimens, each keyed to connect it with the original pressed plant on a herbarium sheet in one of the world's herbaria. The whole quarter million can be contained in a box of 3 cubic feet capacity.

958. ALBIGNAC, A.

634.3

La culture des agrumes dans les pays tropicaux. (Cultivation of citrus in tropical countries.)

*Fruits Primeurs*, 1942, 12: 63-6, 93-8, 122-30, 146-50.

The paper opens (pp. 63-6) with a discussion on the progress and conditions of citrus cultivation in various parts of the world, especially the tropics. The remainder of the paper deals very fully with the industry in French Guinea.

959. BEY-ROZET, L., AND MIED, C.

634.32

Étude sur les tangelos, fruits à jus. (A study of the tangelo, a fruit with a high juice content.)

*Fruits Primeurs*, 1940, 10: 139-44.

The tangelo is essentially a fruit suitable for juice extraction. In this paper a study is presented of the varieties Wekuwa, Sampson, San Jacinto and Thornton as grown in Morocco with special reference to the character of their fruit. Physical and chemical analyses of the fruit of each are given, the order of merit as regards juice quality being provisionally fixed in the order given, failing a more thorough study of their performance in the juice factories.

960. BRICHET, J.

634.31-2.183

Nos orangeries sous le sirocco. (The effect of hot winds on Algerian orange orchards.)

*Fruits Primeurs*, 1942, 12: 143-5.

From the point of view of fruit growing Algeria has been called a cold country in which it is always hot and the citrus grower especially has to counter both freezing and desiccation. For example at Cheliff in 1942 young orange plantations had to submit in February to temperatures of -5 or -6° C. and less than 3 months later to a scorching wind under a burning sun with temperatures of 55° C. Some of the effects of extreme heat on citrus are scorching of leaves, drying up of the fruiting twigs, bark scorch, defoliation, drop of immature and blemishing and dwarfing of adult fruit. There is often death from apoplexy caused by rapid and excessive transpiration of the leaves combined with failure by the soil and roots to replace the moisture thus lost. Leaf scorch is more harmful than defoliation because the dead leaves remain on the branches and cause the death of the latter by sap exhaustion or by diffusing a gummy brown substance in the twigs. Young leaves and sucker shoots generally are less harmed by the sirocco than older leaves and fruiting branches. There is less resistance among grafted than among seed-grown plants. This phenomenon occurs also in quince. The wild quince can resist the severest droughts but cannot live without water when grafted with pear scions. Citron is the most sensitive but, since it defoliates easily, scorching seldom occurs. Large-leaved oranges such as Jaffa scorch badly, mandarin and grapefruit seem more resistant. Diseased and pest infested trees are very susceptible. Fruit in the early stages of formation always drops, if larger its development is checked. An autumn sirocco will infallibly cause splitting on all outside fruits. There is a good deal of bark scorch on unshaded trunks and branches which results in necrosis and subsequent debility. This can be largely avoided by keeping the tree well furnished. Other palliatives consist in the maintenance of adequate soil moisture by means of irrigation and mulching. Windbreaks on the southern side are useful during the summer but the shade they cast during winter, when the sun rays strike obliquely, acts as a distinct

check on photosynthesis. This does not apply in California, because the drying winds blow from the north-east. White-washing of trunks is practicable, but the use of water sprinklers as practised in California is not yet feasible in N. Africa. Spraying with white oil is useful but not safe unless done 5 or 6 weeks before the wind, and protection only lasts for 3 months. The removal of water shoots is an effective but all too neglected precaution chiefly because growers fear thereby a reduction in cropping potential. In young plantations especially the immediate removal of branches bearing scorched leaves is indispensable and will check the spread of dieback. The only method of restoring vitality to stricken trees appears to be by copious irrigations, especially at night.

961. BRICHET, J. 634.31-2.183

En parcourant les jeunes orangeries abîmées par le siroco d'Octobre-Novembre dernier . . . explications—suggestions—conseils. (Explanations and advice following a survey of young orange plantations injured by the sirocco of October-November 1942.)

*Fruits Primeurs*, 1943, 13: 50-1.

In the autumn of 1942 numbers of young citrus trees in the orange groves of Morocco were severely damaged by a prolonged series of hot winds, the young leaves and shoots being practically cooked. In this type of damage, which is distinct from and more lethal than the heat injury which causes wilting and defoliation, a harmful gum is formed capable of diffusing into uninjured tissue and of causing reactions far from the site of the original burn. Young branches are often fatally injured by the scorched leaves persisting on them, for no natural defoliation is associated with this type of burn. [For preventive measures, see previous abstract.—Ed.]

962. BARTHOLOMEW, E. T., AND SINCLAIR, W. B.

634.31-1.547.6: 581.192

**Soluble constituents and buffer properties of orange juice.**

*Plant Physiol.*, 1943, 18: 185-206, bibl. 20.

At the Citrus Experiment Station, Riverside, California, certain properties of the juice of Washington-Navel and Valencia oranges were studied at various stages of maturity. The percentages of total soluble solids and of total sugars increased and that of acids decreased at approximately the same rate during maturation. After commercial maturity was reached sucrose and acids decreased still further, while the percentages of total soluble solids, total sugars and reducing sugars continued to increase, the first, however, at a reduced rate as compared with the sugars. For the period from 29 September (fruit still green) until 2 March (maturity) the following figures relating to the composition of the juice are given: 63-77% total sugars (35-40% sucrose; 27-38% reducing sugars), 23-28% acids, 15% other substances. Large fluctuations of total acidity occurred without change in pH. Over a range of acid concentration (0.7-2.6), however, the pH increased with a decrease in total acidity. The buffer capacity of the juice was found to be due chiefly to organic acids and inorganic salts, the soluble pectins affecting it only insignificantly. Diluted (1-4) and undiluted juice had the same buffer capacity.

963. (HOLMES, A. D., AND OTHERS.) 634.3: 577.16

**Vitamin C content of oranges.**

*Nature*, 1943, 152: 74.

Observations on the vitamin C content of oranges published in the *New England Journal of Medicine*, 7 January, 1943, record a considerable seasonal influence on the nutritional value of oranges. The fruit is heavier and contains more uice at a lower vitamin C cost in December than at any other season of the year. The cost of 75 mgm. was 4.8 cents in March, 5.9 cents in June and September and 3.6 cents in December.

964. CAPELLADES, —. 634.322

Contribution à l'étude du clémentinier sous forme humoristique. (A light-hearted contribution to the study of the Clementine orange.)

*Fruits Primeurs*, 1940, 10: 210.

The author succeeded in inducing a non-bearing Clementine orange\* to set a good crop by twisting a rubber strip, in this case the inner tube of a bicycle, tightly round the trunk in the manner of a tourniquet when the tree was about to flower. The Clementine is notorious for non-setting though it flowers freely. Although written in humorous vein the results obtained were genuine. It is stressed that ligatures such as cord or wire which would cut the bark should not be used.

965. PETIT, R. 634.322

Nouvelle contribution à l'étude du clémentinier et en particulier de son improductivité. (Causes of unfruitfulness in Clementine orange in Morocco.)

*Fruits Primeurs*, 1941, 11: 3-5.

Observations and experiments by the author in an attempt to discover the causes of frequent unfruitfulness in the Clementine orange in Morocco have led to the following conclusions. The Clementine orange\* is already breaking up into distinct types some of which are self-sterile. The common oranges and lemons are good pollinators for it in the following order of efficiency, mandarin, Malta orange, bigaradier (sour orange), Portuguese semi-blood, citrons (cedratier). [The theory of self-sterility is not accepted by all, see abstract 966.—Ed.] The pollen of the mandarin causes extra seediness (12 to 15 seeds against 4 to 10 for bigaradier pollen and nil when successfully self-pollinated). Often in spite of the most favourable conditions for pollination the trees, though flowering freely, fail to set fruit. Fruit set in such trees can be induced by some sap-controlling operation such as ringing; even the restriction caused by the raphia tie of a bagged blossom cluster will induce fruit set. Clementines on stocks less vigorous than bigaradier such as trifoliolate and citron or on double-worked stocks with mandarin or sweet orange intermediates fruit freely and regularly. It may be taken as conclusive that bigaradier is too robust a stock, but the alternative stocks also have their failings. Trees on citron seldom live longer than 10 to 12 years; trifoliolate stock only does well on deep alluvial, lime-free soils. Success probably lies in the selection of a bigaradier stock of less vigorous growth habit.

966. LAMOUR,\* R. 634.322

Le clémentinier producteur régulier de 300 quintaux de fruits à l'ha. (The Clementine orange, regular bearer of 300 quintals of fruit per hectare.)

*Fruits Primeurs*, 1941, 11: 143-5.

The acreage under Clementine orange\* in North Africa is increasing. The paper presents a study of the tree. So far few mutations have occurred in it and those few are undesirable, namely, a barren sort with mandarin foliage, a dry-fruited sort and forms with irregularly-shaped fruits. The bigaradier is the chief rootstock employed though *Citrus triptera* [i.e. *Poncirus trifoliata*, the trifoliolate orange.—Ed.] is proving satisfactory. In comparative trials in various localities of the two stocks, although there were some failures, the general balance was in favour of trifoliolate as regards robust development of the scion whereas this stock has a dwarfing effect on most other varieties. Other effects of trifoliolate on the Clementine are a less erect habit, less twiggy growth, larger and longer leaves and greater wind resistance. Sometimes the Clementine is double-worked with mandarin, sweet orange, etc., as the intermediate. There is no marked difference between these two trees worked directly on bigaradier, but a mandarin intermediate seems to make the tree more exacting and less fruitful compared with sweet orange intermediate. Cross

\* Tangerine × sour orange.



pollination with other varieties is shown to be unnecessary, but at flowering time in the Clementine orchards there should be at least one beehive to every 4 ha. The Clementine is very liable to defoliation from hot winds and if there are several of these in a year the trees are greatly checked, damage increasing with distance from the windbreak. A disadvantage of the Clementine is that it often does not bear its first crop till its tenth year. Attempts to hasten bearing by various pruning methods or by ringing have been occasionally successful but a discreet application of manure which, while keeping the tree from excessive foliage, will also prevent starvation seems the most effective. A warning is given against intercropping luxuriant unfruitful trees with vegetables or any crop requiring feeding. The practice will delay fruiting still further. It is obvious that in general the Clementine, to be at its best, will require more cultural care than most citrus varieties in N. Africa.

967. BEVANÇON, L. 634.322-1.542.24  
Essais de mise à fruits du clémentinier effectués à la station expérimentale de Boufarik depuis 1939. (Attempts since 1939 to induce bearing in unproductive Clementine oranges at Boufarik experiment station, Algeria.)  
*Fruits Primeurs*, 1942, 12: 232-4.

Factors involved in the frequent low yields of Clementine orange\* in Algeria appear to be hot winds which cause defoliation and subsequent blossom drop from lack of nutrition through absence of leaves, insufficient penetration of irrigation water in March and April and to a less extent pollen sterility. The author, however, considers that with young trees unbalanced nutrition produces over-vigorous vegetative growth which causes the flower buds to fall. After 10 or 12 years the trees settle down and become fruitful. Certain experiments in ringing were carried out and are described. A strip of bark 3 mm. in width was taken from two-thirds of the circumference of the trunk, the height above ground not being stated; the wound was painted with bordeaux mixture. Treated trees gave an average of 66-8% increase over untreated controls. The treatment is useless for trees not in good health or in wind-swept positions and should only be used on vigorous young trees. On less vigorous trees it may seriously delay development. Ringed trees must receive the best cultural treatment as regards manure and irrigation. The 3 mm. rings close within the year, but a trial ring 8 mm. wide on a thick branch, while causing heavy bearing, did not close for 3 years, the branch meanwhile becoming chlorotic and sickly.

968. HALL, E. G. 631.541.12: 634.31 + 634.323  
Effect of stocks on citrus fruit quality. Trials with Navel, Valencia and Marsh grapefruit.  
*Agric. Gaz. N.S.W.*, 1943, 54: 173-6.

In trials conducted during 1940 and 1941 by the Food Preservation Laboratory, Homebush, Washington Navel and Valencia oranges as well as Marsh grapefruit were grown on 3 different stocks, namely rough lemon, sweet orange and trifoliolate, in 3 different parts of New South Wales. Fruits from trees on trifoliolate stock, both oranges and grapefruit, were often highest in specific gravity and juice contents, were usually highest in acidity and were in nearly all cases highest in soluble solids in the juice and in flavour.

969. SINGH, S. 634.31-1.541.11  
The choice of rootstocks for blood-red orange.  
*Punjab Fruit J.*, 1942, 6: 1174-5.

Provisional results with citrus rootstock trials laid out at the Horticultural Station, Montgomery, Punjab, in 1937 indicate that for the blood orange jatti khatti is outstandingly the best rootstock. Kharna khatta proved incompatible and mokari was also unsuitable. The other stocks in the trial are mitha and jullunduri khatti. Trees bearing the thin-skinned, oblate form of blood-orange are to be preferred as bud parents, the elongated thick-skinned fruit being of inferior quality.

970. BRICHET, J. 634.3-1.536  
La transplantation à racine nue. (Bare root planting of citrus.)  
*Fruit Primeurs*, 1941, 11: 197-9.

Since packing material and transport facilities have almost vanished in N. Africa, the planting of young citrus with bare roots instead of the customary ball of soil has been undertaken with success when certain precautions have been observed. The operation should preferably take place at the end of winter, while dormancy still persists if on heavy wet soils, and in autumn on light soils which warm up easily. Delay between lifting and replanting should be reduced to a minimum. The trees are headed back some days before removal, leaving about a quarter of the original growth in the form of ripened wood well furnished with buds, the presence of old leaves being immaterial. The larger pruning cuts should be stopped with mastic. The trees should not be watered before lifting, in fact a slight wilting is an advantage. The most important operation of all is that the roots and the lower part of the stem should be at once dipped in a semi-liquid mixture of mud and fresh cow dung. They are then shaded and packed in bundles for removal to the site. On reaching their new quarters they must not be distributed to their respective holes in advance of planting but kept under cover till needed. A good plan is to stand them in a barrel or deep box on a handcart and let them accompany the planters. Even if the weather is wet an immediate watering is required to assist in packing the earth round the roots and the trunks must be at once whitewashed. Plants so treated are often superior in vigour and yield to those planted with the orthodox ball of soil attached.

971. BENTON, R. J. 634.3-1.67  
Citrus trees and their irrigation needs.

*Agric. Gaz. N.S.W.*, 1942, 53: 566-8, and 54: 33-5.  
Citrus irrigation problems in N.S.W. are discussed. In all except deep well-drained sandy loam soils decline of citrus occurs. This can usually be traced to excessive use of water leading to *Phytophthora* root decay. Water should only be applied when the trees are near or even at wilting point, hence irrigating at fixed rotational periods is not the best method. In applying water, penetration should be to the depth of most of the roots. Penetration to lower levels may affect the health of the trees by building up a permanent water table, it wastes water and leaches soil nutrients. The frequent use of the soil auger to determine depth of penetration is advised.

972. BRICHET, J. 634.31-1.542  
Étalez la frondaison basse des orangers mais ne la supprimez pas. (Support but do not suppress the lower foliage of orange trees.)  
*Fruits Primeurs*, 1942, 12: 36-7.

A common custom in North Africa is to cut away those lower branches of citrus trees which are in contact with or very near to the ground. It is considerably more profitable to prop them up by means of forked sticks of various lengths than to cut them away or allow the fruit to touch the ground. It is calculated that an orchard of 275 trees per hectare in which the fruiting branches are allowed to touch the ground loses 1,500 kg. of fruit per hectare. The effect is even worse when the lower branches are pruned away, for, in addition to the loss of crop, the trees may suffer a check in growth and run a risk of bark scorch.

973. DE ALENCAR, J. 634.3-2.411  
Podridão do pé dos citros. (Foot rot of citrus.)  
*Ceres*, 1941, 2: 488-96, bibl. 9.

An account of foot or collar rot of citrus (*Phytophthora parasitica*) with special reference to Brazil.

974. KLOTZ, L. J. 634.3-2.411  
Phytophthora infections of citrus and their control.  
*Calif. Citogr.*, 1943, 28: 200-1, 220-1, bibl. 2.

A brief account is given of some of the laboratory technique used in the study of the *Phytophthora* infections of citrus.

\* Tangerine × sour orange.

A study of the relative resistance or susceptibility of various rootstocks to brown rot gummosis, *P. citrophthora*, discovered the promising Sampson tangelo. The hybrid comes nearly 100% true from seed, forms good unions and is nearly as resistant as sour orange. Resistance to root infection in alkaline soils by brown rot zoospores and to small concentrations of toxic nitrites is also good. The significance of temperature relations in the control of brown rot in the field and packing station is explained with the aid of graphs and tables. For practical purposes effective control on picked lemons can be obtained by immersion for 4 minutes in hot soda ash ( $1\frac{1}{2}\%$ - $1\frac{3}{4}\%$  and soap  $\frac{1}{2}\%$ ). Turgid fruit picked in cold weather may be injured by hot water causing spotting through the liberation of toxic rind oil and the subsequent entry of moulds. This can be avoided by wilting the fruit for a few days before washing. In field control copper sprays were practically 100% effective when used with any of the following sticker-spreaders, (1) petroleum oil with sulphonic salts and an organic surface tension depressant, (2) sodium oleyl sulphate plus a synthetic resin, (3) metal soap with casein and sulphonic salts in a petroleum oil emulsion, (4) whale-oil resin soap, (5) casein, the parent protein, not its calcium or sodium salts. The new fungicide tetrachloro-p-benzoquinone sprayed on picked fruit in concentrations ranging from 1 lb. to  $\frac{1}{2}$  lb. per 100 gal. gave 100% control compared with 25 to 40 infections per fruit for the unsprayed checks. The cost can compete with copper, which is now scarce. Growers are urged to try the new material in comparison with bordeaux mixture.

975. PERSING, C. O., BOYCE, A. M., AND BARNHART, C. S. 634.3-2.73

Present status of citrus thrips control.  
*Calif. Citrogr.*, 1943, 28: 142, 165.

The problems involved are (1) the location and extent of areas in California in which a strain of citrus thrips resistant to tartar emetic has become established; (2) control programme in resistant areas; (3) laboratory investigation to determine the biological nature of this resistance; (4) laboratory and field tests of various new materials on the resistant strain. (1) In 1942 satisfactory control was obtained on all but about 300 acres in the San Fernando Valley and on about 100 acres each in Edison and Porterville districts. For reasons given it is considered that actually resistance to tartar emetic extends over a far wider area. Development of resistance does not appear to be correlated with the number of previous treatments. (2) Tartar emetic spraying should continue in districts where it was satisfactory last year. Where unsatisfactory on lemons a spray made up of nicotine sulphate 1 qt., sugar 8 lb., water 100 gal. is suggested, applied at the rate of  $2\frac{1}{2}$  to 3 gal. per mature tree by broom guns or boom sprayer, or 1 gal. per tree if applied with a spray duster. For oranges a sulphur dust or lime-sulphur spray for spring treatment is advised and the nicotine spray in late summer treatment, if required, to reduce foliage scarring. It is pointed out that these recommendations have not been fully tested. Results of (3) and (4) are not dealt with.

976. BEDFORD, E. C. G. 634.3-2.73

The biology of the citrus thrips.

*Fmg S. Afr.*, 1943, 18: 275-80.

The biology of the citrus thrips is briefly reported and the difference between thrips damage and wind blemishes on oranges is described.

977. NAUDE, T. J. 634.3-2.77

The control of fruit fly in citrus orchards.

*Citrus Gr.*, 1943, No. 110, pp. 1-2.

Advice is given on the most modern methods of dealing with fruit fly in South African citrus orchards. Poison baiting does not begin until the indicator traps, containing Clensel 1 part to water 30 parts or terpinol acetate dissolved in whale

oil and floated on water, are found to contain flies. One indicator trap per 30 trees is suggested with at least a twice-weekly examination. Special fruit fly white glass jars are on the market but any wide-mouthed jars make suitable traps. The poison bait recommended is sodium fluosilicate 1 oz., white sugar 2 lb., water 4 gall. applied by spraying at the rate of 12 oz. per tree so that it wets the leaves in the form of small droplets. This bait is 16 times more toxic than arsenate of lead used in the Mally bait. Evergreen trees such as citrus provide shelter for the flies in winter and late hanging fruit may be damaged by migrations from deciduous orchards. In fact the majority of fruit flies breed outside the citrus orchards and enter them for food and shelter. They will breed in rotting or overripe fruit, thus orchard sanitation should be strictly carried out and fallen fruit, including that of nearby peach orchards, should be collected and buried 3 ft. deep or submerged for a week in water, usually in oil drums specially prepared for the purpose.

978. CAMPBELL, T. G. 634.3-2.753-2.96

Introduction of scale parasites from California.

*J. Coun. sci. industr. Res. Aust.*, 1943, 16: 41-2.

Two parasites of citrus pests have recently been introduced into Australia and have been established at the Council's laboratories in Canberra. They are: *Comperiella bifasciata*, parasitic on the red scale of citrus, *Aonidiella aurantii*, and *Metaphycus helvolus* developing on the black scale, *Saissetia oleae*.

979. WOGLUM, R. S. 634.3-2.944

Tent pullers—the latest advance in fumigation.

*Calif. Citrogr.*, 1943, 28: 143, 158.

Equipment is described and illustrated for covering and uncovering citrus trees with fumigation tents by mechanical means. The strenuous work involved by hand covering has of late rendered it very difficult to secure suitable labour. These machines, which have now been in general operation for a year, can be worked by light-weight men or even women and have already proved their value.

980. STOFBERG, F. J., AND LE ROUX, J. C.

634.3-2.651.3

Citrus nematode investigations.

*Fmg S. Afr.*, 1943, 18: 259-60, 280, bibl. 10.

Investigations on the citrus nematode, *Tylenchulus semipenetrans* Cobb., carried out in the Eastern Transvaal, Northern Transvaal and Eastern Cape on 720 trees, indicated that there is no correlation between the presence of nematodes in the roots and the greening of the fruits.

981. CARVALHO, R. DE S. 634.3-2.651.3

O nematôide das raízes das plantas cítricas *Tylenchulus semipenetrans* Cobb.—e sua possível relação com a doença "podridão das radículas". (The citrus root nematode—*Tylenchulus semipenetrans* Cobb and its possible relation to the rootlet rot disease.

*Rev. Agric. S. Paulo*, 1942, 17: 423-34, bibl. 12.

A root disease of citrus new to São Paulo is probably associated with the nematode *Tylenchulus semipenetrans*. A general account of the distribution, comparative symptoms and morphology is given. The methods used in California for getting rid of this pest proved useless. The possibility of biological control by means of the predaceous nematode *Mononchus papillatus* is worth consideration.

982. NAUDE, T. J. 634.3-2.78

Control of false codling moth in citrus.

*Citrus Gr.*, 1943, No. 110, pp. 9-10.

983. MOSSOP, M. C. 632.97: 351.823.1

Plant pests from abroad.

*Rhod. agric. J.*, 1943, 40: 81-8.

A historical survey of imported pests with an appendix on the regulations governing the import of plants into Rhodesia.



984. MANNS, T. F. 633.492-2.4  
A new root-dip treatment for sweet potato sprouts to control wilt.

56th Trans. Peninsula hort. Soc. 1942, 1943, pp. 80-1, bibl. 5.

One year's work at Newark confirms previous trials and indicates that root dipping in Spergon (tetrachloro-para-benzoquinone) affords a better control of wilt in sweet potato than Improved Semesan Bel and Yellow Cuprocide.

985. DAINES, R. H. 633.492-2.4  
Thiosan (tetramethyl thiuramdisulfide) and scurf control in sweet potatoes.

Phytopathology, 1943, 33: 410-2.

Although the data obtained were not regarded as conclusive, it would appear from the experiments carried out at the Agricultural Experiment Station, New Brunswick, in search of a mercury substitute (1) that thiosan 1-5 offers considerable promise as a sweet-potato-sprout dip for scurf control, (2) that delayed planting after Semesan Bel treatment increases the fungicidal efficiency of the treatment and also the likelihood of chemical injury.

986. BROWN, D. D. 633.71-1.875  
Use of compost in the manurial treatment of flue-cured tobacco.

Rhod. agric. J., 1943, 40: 110-4.

Trials were conducted by growers to investigate whether shortage of fertilizers can be compensated by the application of compost. The results showed that a dressing of about 5 tons of compost per acre—if possible, prepared according to the simplified process modified by Timson\*—makes the fertilizer go twice as far and improves the quality of the tobacco.

987. HODGSON, R. W. 634.451+634.16+634.413  
Our research program on the minor subtropical fruits.  
Yearb. Calif. Avocado Soc. 1942, 1942, pp. 113-5, bibl. 5.

A brief report on the work of the Horticultural Department, University of California, Los Angeles, on minor subtropical fruits. The oriental or kaki persimmon (*Diospyros kaki*). Nearly all the varieties introduced into U.S.A. before 1928 have been described. All the more recent introductions are now growing in the University gardens. None seems likely to replace Hachiya, the most important variety grown in California. Five groups have been distinguished, namely, those producing (1) only female flowers and thus seedless fruits in isolated trees or block plantings, (2) male and female flowers regularly, (3) usually only female flowers but occasionally both male and female, (4) usually both male and female flowers and occasionally only female flowers and seedless fruits or only male flowers and no crop, (5) only male flowers and no crop. The male varieties may be useful for pollinating when seeds are desired for rootstock purposes and also to check excessive fruit in the case of shedding in young plantings of pistillate varieties, though fruit will then be seedy. Most varieties when bearing a seedy crop have a marked tendency to overbear which often initiates an alternate bearing cycle. The excessive shedding of some pistillate varieties with seedless fruit may be checked by girdling in spring. Rootstock trials indicate that with Hachiya lotus stock invigorates the tree and accentuates fruit drop and that this variety bears better on kaki. Lotus shows some incompatibility with Fuyu to the extent of dwarfing it and shortening its life, though yield is high. Kaki is the best general stock though Fuyu has done exceptionally well on virginiana. Pruning in the case of young trees is markedly repressive to growth and early bearing; later, with Hachiya, it seems probable that modified open head or delayed leader pruning is best. The loquat (*Eriobotrya japonica*). After bearing a heavy crop the loquat tends to be thrown into biennial bearing which, however, may

\* *ibidem* 1942, 39: 161-6, H.A. 12: 1483.

be controlled by fruit, fruit-cluster or flower-cluster thinning. Thinning increases the size of the remaining fruit approximately in proportion to the numbers of fruit removed. Removal of late clusters increases the percentage of early ripening fruit. The method recommended is the removal in late summer of about three-quarters of the young flower clusters before they exceed 3 inches in length. The cherimoya (*Annona cherimola*) Deliciosa is the cold-hardest of the horticultural varieties with Booth intermediate. Large yield increases and much higher percentages of well-developed fruit have resulted from hand pollination. White sapote, Matasano, Feijowa, Natal plum (*Carissa*). Variety trials are in progress on these and the other fruits mentioned.

988. REBOUR, H. 634.1/7  
Planteurs ! Mettez l'arbre qu'il faut à la place qui lui convient. (Climatic zones and fruit tree planting in N. Africa.)

Fruits Primeurs, 1943, 13: 24-7.

Algeria is divided by climate into 6 natural fruit-growing zones, 4 being governed by altitude and 2 by degrees of aridity. The climatic characteristics of each region are briefly summarized and a list is given of the fruits most likely to succeed there. A useful chart is provided which shows at a glance the altitudes or desert regions in which each of 30 kinds of fruit does best and those in which certain risks must be accepted.

989. BRICHET, J. 634.16  
Que pouvons-nous attendre de l'exploitation commerciale du néflier et de notre production de vivaces "nèfles du Japon"? (Commercial possibilities of the loquat in Algeria.)  
Fruits Primeurs, 1942, 12: 91-2.

The loquat is perfectly suited by the climate of N. Africa and a few hundred hectares of commercial plantations exist already on the Algerian littoral. They have the advantage of ripening in April and May when other fruit is scarce. Three varieties are chiefly grown, the white-fleshed Early Red and Champagne and the yellow-fleshed Tanaka. All three have firm hard-skinned fruits which in theory enables them to stand up to overseas transport. Actually this is seldom the case and so to avoid damage the loquat is picked before it is ripe. The result is a fruit which is almost uneatable because development of immature loquats ceases at the moment of detachment from the tree. The only solution lies in pre-cooling the ripe fruit immediately after picking and carrying it overseas in a suitable temperature (not specified). Until such a refrigerating service is established, the local markets offer the best prospects provided they are not glutted and no other fruit is in season.

990. EASTWOOD, H. W. 634.413  
The custard apple.  
Agric. Gaz. N.S.W., 1942, 53: 475-6, 521-4; 54: 36-8, bibl. 2.

Of the 4 species of custard apple which have attracted attention in Australia, the cherimoya (*Annona cherimola*) is most suited to the sub-tropical conditions of the North Coast district of N.S.W. The tree is free-flowering, but a shy bearer, having no mechanism for self-pollination, while cross-pollination depends on insect visitors which are often infrequent. The stigmatic surface, too, soon dries up under the hot dry conditions usually prevailing at blossom time. The fruits develop best on the lower and more sheltered parts of the tree. To obtain fruit of quality early grown fruit is required. Late fruit is often affected by cold. Soil type is less important than good drainage, though a rich, fairly moist medium loam will grow the best trees. Badly drained soils produce spindly and weak growth with premature leaf drop and poor leaf colour. Propagation is by budding in summer or preferably by grafting in spring on seedling stocks  $\frac{3}{8}$  to  $\frac{1}{2}$  in. in diameter, using for budding large buds about  $1\frac{1}{4}$  in. long and for grafting scions of

1-year-old dormant wood, both buds and grafts being taken from the most productive wood. Planting distance should be 28 to 30 ft. apart at least. Cultivation when the trees are grown must be shallow because of the many surface roots. Fruit is borne on current year as well as older wood. Pruning is carried out at the end of the dormant period when the buds are beginning to swell and at no other time without risk of injury. Instructions are given for building up the framework of the tree from first planting. A fairly high head should be formed because of the pendulous and straggly habit, with a fairly open centre. Once formed, attempts to change the shape by severe pruning will only be harmful. Roots of newly planted trees are easily injured by direct contact with fertilizers but when properly applied to growing trees 4 weeks before flowering fertilizers have proved beneficial at the Grafton Experimental Farm Orchard. The article concludes with illustrated instructions for packing for market.

991. BRICHET, J. 634.64  
Le grenadier et les grenades, culture et production de demain. (The future of the pomegranate.)  
*Fruits Primeurs*, 1942, 12: 115-6.

The suitability of Algeria for the production of pomegranates on a large scale is pointed out. There are innumerable named varieties in existence. Those worth perpetuating should have large fruits with coloured granules, pulpy, juicy and seedless, with a tough outer skin, be easy to peel and resistant to *Sterigmatocystis* or internal rot. Such varieties are scarce and the difficulty is to secure conscientious selection among local nurserymen.

992. HODGSON, R. W. 634.653-1.84  
The nitrogen requirement of the avocado tree in California.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 33-5, bibl. 3.

Field observations are cited of the responses to nitrogen of avocado and citrus trees under similar conditions which seem to indicate that contrary to general supposition the nitrogen requirement of avocado is substantially the lower. This is supported by limited experimental evidence. Fuerte avocados were equally unaffected by high, medium or low nitrogen treatments over a period of 4 years. The high N treatment consisted of the annual application of 50 lb. of ammonium sulphate, the low N treatment of digging in 200 lb. of cereal straw under the spread of the tree. A somewhat similar experiment applied to Valencia orange, using about half the amount of nitrogen employed for the avocados, gave pronounced differences in foliage colour between the high and low N treatments within a few months. Avocado trees under sod culture continue to bear freely, whereas citrus in sod will usually require heavy manuring and even then will show the leaf symptoms and poor fruit set characteristic of N deficiency. This is not to say that avocados do not benefit from a moderate application of nitrogen fertilizers, but it is safe to assume that the amounts may be naturally reduced compared to what is considered necessary for citrus orchards.

993. EGGERS, E. R. 634.653-1.531  
Effect of the removal of the seed coats on avocado seed germination.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 41-3.

Removing the seed coats from avocado seeds prior to sowing hastened germination from 4 to 6 weeks and promoted uniformity in stand and size. The experiments were carried out with similar results during 3 seasons at the University of California.

994. SCHROEDER, C. A. 634.653-2.19  
Woody avocado fruits.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 54-5, bibl. 1.

An anatomical examination of the abnormal woody fruits often observed in avocado orchards suggests the possibility

that the avocado fruit may be of partially modified stem origin.

995. CUMMINGS, K., AND SCHROEDER, C. A. 634.653: 581.47

Anatomy of the avocado fruit.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 56-64, bibl. 5.

A well illustrated summary of work recently undertaken by the authors to appear in due course in appropriate technical journals.

996. MCGREGOR, E. A. 632.654.2: 634.653  
The avocado mite of California, a new species.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, p. 68, bibl. 1.

A species of spinning mite attacking avocado in California, formerly confused with *Paratetranychus yothersi* of Florida, has been separated and named *Paratetranychus coiti* sp. n.

997. ROUNDS, M. B. 634.653-1.4  
Handling avocado soils.  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 69-70.

The ideal soil for avocados is porous and well aerated containing a large proportion of sand and gravel. Avocado roots are very sensitive to a restricted air supply. Trees on soils with a comparatively loose upper stratum but a compact subsoil will show dieback after a few years and any lack of drainage is fatal. Cultivation should be shallow on account of the great number of surface feeding roots. A permanent cover crop should not be grown on any soil that is not easily permeated by water.

998. LAMMERTS, W. E. 634.653-1.523  
Progress report on avocado breeding [California University].  
*Yearb. Calif. Avocado Soc.* 1942, 1942, pp. 36-41, bibl. 1.

999. LONG, E. M. 634.62: 581.145.2  
Developmental anatomy of the fruit of the Deglet Noor date.  
*Bot. Gaz.*, 1943, 104: 426-36, bibl. 13.

The author distinguishes seven periods in the development of the Deglet Noor date from pollination to maturity. Histological facts are given for the various stages. The highest rate of fresh weight increase occurred in the 4th period (16 June-13 July). By 22 August the now pink fruits had reached their proper length. After an increase of dry matter during the 6th period the fruits acquired a brown colour in the last period (22 September-3 November) and softened as a result of dehydration and partial dissolution of cells. The experiments were carried out at the U.S. Date Garden, Indio, California.

1000. WOOLLEY, F. 633.88  
O tongue (*Aleurites fordii*). (The tung tree.)  
*Rev. Agric. S. Paulo*, 1942, 17: 435-7.

There are over a million tung trees growing in São Paulo, Brazil, but much ignorance still exists concerning their cultivation. A few general principles are laid down. Any grower with unhealthy trees is urged to apply at once for technical advice from the Oil Plants Section of the Ministry of Agriculture.

1001. WOOSTER, J. L. 633.85  
Tung growing in Latin America.  
*Agric. Amer.*, 1943, 3: 29-33, bibl. 10.

An account of the progress of the tung growing industry in certain South American Republics, prefaced by some botanical and cultural notes. *Paraguay*. Experimenting with the crop has been in progress since 1928 but information on production and acreage is not officially published. An unofficial estimate suggests about 1,500 acres in the Hohenau colony with a few scattered plantings elsewhere. Soil and rainfall are suitable but the climate does not permit of a



sufficiently long resting season. A tung experiment station is to be attached to the National School of Agriculture, Argentina. The last census, 1936-7, recorded 564 Argentine farms with 370,622 tung trees on 8,406 acres. The two chief problems consist of ant control, especially during the first 3 years of tree growth, and, in the Misiones area, the need of a satisfactory method of drying the fruit soon after it falls. Frequent rains during the harvesting period make it impossible to allow the fruit to dry on the ground. Interest in tung is increasing and many hundred acres have been planted since the census. There are 3 mills expressing tung oil, strategically sited in respect to producing acres. Brazil. Plantings of bearing age are distributed at the present time as under: 200,000 in the State of São Paulo, 57,000 in Paraná and 50,000 in Rio Grande do Sul, with many thousands of young trees shortly coming into bearing in all three States. The 3 mills are all situated in São Paulo as the principal producing State, their first commercial

output being in 1942, all nuts before that date having been used for seed. A Tung Oil Society has been formed in Brazil to look after the interests of growers in all possible ways. No rapid change in the tung oil situation through South American production can be expected for some time owing to the botanical nature of the tree.

1002. ZOHARY, M. 631.459: 634.9  
On the "Ghada" tree of northern Arabia and the Syrian desert.  
*Palestine J. Bot. (J.)*, 1940, 1: 413-6, bibl. 11.

Specimens of the tree *Haloxylonetum persici*, the economically highly important "Saxaul" tree of Central Asia and Persia, were identified in the Arabian and Syrian deserts. Afforestation of wide desert tracts is advocated to provide food for desert livestock, as well as wood for fuel and charcoal, and at the same time to control the extension of mobile sands.

## TROPICAL CROPS.

1003. ANON. 551.566.1: 63  
The Tingo Maria Experiment Station.  
*Science*, 1943, 97: 155.

A note on the establishment of an agricultural experiment station at Tingo Maria, Peru, to which Dr. B. J. Birdsall of the Office of Foreign Agricultural Relations, U.S.A., has been appointed Director. The U.S.A. is contributing financial and technical aid and Peru the land, buildings and other facilities. The site is on the Huallaga River on the eastern slopes of the Andes. The station is one of a series which are being established throughout the American tropics to assist the production on a large scale of rubber, quinine and other products formerly obtained from the Far East.

1004. MOORE, R. E. 633/635  
What shall the Americas grow?  
*Agric. Amer.*, 1943, 3: 83-5.

A discussion of the United States' programme of collaboration in agricultural research with South American Republics. General production research stations supported jointly by U.S.A. and the government of the country concerned are now operating at Tingo Maria (Peru), Quevedo (Ecuador), and San Andrés (El Salvador). U.S.A. Department of Agriculture Co-operative Rubber Plant Field Stations are established at Turrialba (Costa Rica), Tela (Honduras), and Marfranc (Haiti). Department of Agriculture personnel for rubber work are also assigned to agricultural experiment stations of most of the remaining eleven Republics with which the Department has co-operative agreement.

1005. BAKER, R. E. D. 632.1/4: 633/635  
Notes on some diseases of field crops, vegetables and fruits at the Imperial College of Tropical Agriculture.  
*Trop. Agriculture, Trin.*, 1943, 20: 28-32, 59-63, bibl. 25.

These very useful notes are based on records of diseases which occur on crops grown at the I.C.T.A. and in the neighbourhood and were compiled mainly by successive post graduate plant pathologists from 1939 to 1942. The notes are brief but, where possible, references are given to more detailed accounts of symptoms and control. Spraying is seldom recommended because of the author's lack of confidence in it as a method of control of tropical diseases, except in a few well known cases such as banana leaf spot and citrus scab. There is also some difficulty in obtaining the necessary appliances at present. Diseases can often be avoided by paying attention to points of cultivation and by not growing plants in unsuitable places or out of season.

1006. MARMO, J. C., AND DAS NEVES, C. A. 632.4  
Doenças de plantas encontradas no Estado de São Paulo. (Diseases of cultivated plants in the state of São Paulo, Brazil.)  
*Rev. Agric. S. Paulo*, 1942, 17: 407-15.

The commoner fungus diseases of cultivated plants of S. Paulo are listed with the name of the principal host. The Brazilian and scientific names are given for host and disease.

1007. GHANI, M. O., AND ALEEM, S. A. 631.85: 631.821  
Effect of liming on the transformation of phosphorus in acid soils.  
*Indian J. agric. Sci.*, 1942, 12: 873-82, bibl. 8.

The nature of the effect of liming on the increasing availability of phosphorus in acid soils was studied at the Department of Soil Science, Dacca University. Calcium carbonate, calcium hydroxide, calcium sulphate and magnesium oxide were used as liming materials at the rate of 2.5, 5 and 7.5 tons per acre. Soil samples were fractionated at intervals of 4, 6, 8 and 10 weeks. The order of effectiveness in increasing phosphate availability was  $MgO > Ca(OH)_2 > CaCO_3 > CaSO_4$ . The same order of effectiveness applied also for the decomposition of organic phosphorus and for increasing the pH. The data were interpreted as a proof that the greater availability of soil phosphorus after liming is solely due to the decomposition of organic phosphorus compounds.

1008. WIGGLESWORTH, A. 633.526.23  
Situation and prospects of the sisal industry.  
*Crown Colonist*, 1943, 13: 427-8.

When Tanganyika passed to the British Mandate its sisal production was 20,000 tons; to-day it is seven times as much and would be more but for a policy of restriction, temporarily imposed in 1940 and lasting 13 months, causing a dislocation in the industry from which it has not yet recovered for reasons which are mentioned. In discussing the future it is pointed out that labour is available but is not attracted unless it can be drawn to the estates by good food and general living conditions, these things being valued by the African even above wages. On well-managed estates these conditions are provided and every effort is made to provide a well-balanced diet. Many estates have been producing for 50 years and the need for the restoration of soil fertility is becoming apparent. Much research is in progress with this aim. Allusion is made to the system devised in the Netherlands East Indies whereby the flume waste is run by gravity flow direct from the factory to the fields cleared for replanting, being first treated for the extraction of vegetable waste which is used for other projects. This restores the bulk of the vegetable salts which in Africa go to waste. Formerly manufacture concentrated on binder twine and

ply twine, the demand for which, being bound up with the world's grain harvest, was subjected to heavy fluctuations. Other outlets have been found including the production of tow. There are some good illustrations.

1009. SRIVASTAVA, R. C., RAO, K. A. N., AND GUPTA, G. N. 633.61-1.56

Utilisation of waste products of the sugar industry in the cane fields. II. Preparation of composts by hot fermentation.

*Indian J. agric. Sci.*, 1942, 12: 848-50, bibl. 2.

Experiments conducted at the Imperial Institute of Sugar Technology, Cawnpore, suggested that large quantities of press-mud, cane trash, and bagasse could easily be turned into high quality compost by the hot fermentation method. The materials were mixed in suitable proportions and well turned with a thin slurry of cowdung and molasses, after which the heaps were placed in trenches 6 ft.  $\times$  4 ft.  $\times$  3 ft. loosely packed. After 7 or 8 days, when the temperature had risen during aerobic fermentation, the heaps were covered with mud paste, thus stopping aeration. Anaerobic fermentation continued until the compost was ready. This method proved beneficial for conservation of nitrogen and dry matter.

1010. BRAND, D. D. 633.682

Tapioca from a Brazilian root.

*Agric. Amer.*, 1943, 3: 93-6, bibl. 10.

A general account of cassava and its cultivation in the tropics. The bibliography is chiefly concerned with cassava in Latin America.

1011. MACMASTER, P. G. W. 633.73

An interesting experiment on early crop coffees and their classification.

*Mon. Bull. Coffee Bd Kenya*, 1943, 8: 3.

In an experiment carried out by the Kenya Coffee Control Board with coffee supplied by the author to test the validity of the contention of early coffee producers that they are penalized, if forced—usually by Control or for financial reasons—to send in their coffee for milling as soon as it is dry, early coffee stored in parchment for 4 months showed, in spite of some taint and under-dryness, a price gain of £6 per ton for "A" and "PB" over a similar amount hulled and graded as soon as dry. In Kenya early coffee production is on the increase on account of the superseding of single stem by multiple-head system of training.

1012. SMITH, M. R. 633.73-2.752-2.796

The relationship of ants and other organisms to certain scale insects on coffee in Puerto Rico.

*J. Agric. Univ. Puerto Rico*, 1942, 26: 21-7.

The relationship of 3 common ants to the most important scale insects on coffee in Puerto Rico, namely hemispherical scale, *Saissetia haemispherica* (Targ.), and the green scale, *Coccus viridis*, are described. The author observed that the scales were controlled by certain entomogenous fungi, especially *Cephalosporium lecanii*. As a consequence of the fungus favouring shade and moisture scales are less abundant under such conditions.

1013. GUISCAFRÉ-ARRILLAGA, J., AND GÓMEZ, L. A. 633.73: 581.144.2

Studies of the root system of *Coffea arabica* L. Part III.\* Growth and distribution of roots of 21-year-old trees in Catalina clay soil.

*J. Agric. Univ. Puerto Rico*, 1942, 26: 34-9, bibl. 2.

94% of the roots of 21-year-old coffee trees growing in Catalina soil spread in the topmost 12 in. of soil, 4-36% in the 12-24 in. level and 1-05% in the 24-36 in. level. The top-root ratio was 4:1. The authors recommend the digging of deep trenches around the trees in order to induce the roots to grow deeper and the protection of the soil from drought by applying a good mulch. The planting distance

\* For Parts I. and II. see *H.A.* 10:1453 and 12:245.

for coffee should be at least 8 feet, which is the observed lateral spread of roots, and superficially rooting trees should not be planted in coffee groves.

1014. LE PELLEY, R. H. 633.73-2.752-2.96

The biological control of a mealy bug on coffee and other crops in Kenya.

*Emp. J. exp. Agric.*, 1943, 11: 78-88.

An account of the biological control in Kenya of a comparatively recently introduced mealy-bug, *Pseudococcus kenya*, which became from 1923 not only a major pest of coffee but one of the notable mealy-bug plagues of the world, since it also heavily damaged various small-holding crops to an extent that markedly decreased the prosperity of small landowners. A number of parasites were introduced from Uganda following the discovery that the mealy-bug was a new species indigenous to East Africa. Of these two *Anagyrus* spp. and *Pauridia peregrina* have become established. One *Anagyrus* has proved so outstandingly successful that it has practically cleared up the mealy bug wherever liberated. It is not expected that this extremely favourable result will continue unchecked if only because hyper-parasitism will probably increase, but the mealy bug will never become so severe a pest again.

1015. JOLLY, A. L. 633.74-1.55

The effect of age of field on cacao yields in Grenada compared with the Montserrat district of Trinidad.

*Trop. Agriculture, Trin.*, 1943, 20: 47-50, bibl. 3.

An analysis of the effect of manurial status, soil type and age of field on cacao yield in Grenada has recently been published. (*Ibidem*, 1942, 19: 234-43; *H.A.*, 13: 279.) Data have here been analysed for Trinidad in a similar manner to determine whether they contradict or confirm the Grenada findings. Two Trinidad soil groups are used, namely Good Soils and the very poor Brasso Clay. On the average soils of Grenada decline does not set in until 60 years of field age; on the Brasso Clay it begins at 20 years, yet at 20 years the yields do not greatly differ between the two. The sharp declines in yield on Brasso Clay are due not so much to the trees dying out as to their becoming unproductive for some reason: Some of the different results on the two soils are tabulated and discussed.

1016. VINE, H., THOMPSON, H. A., AND HARDY, F. 633.74-1.432

Studies on aeration of cacao soils in Trinidad IV.

*Trop. Agriculture, Trin.*, 1943, 20: 51-6.

HARDY, F. 633.74: 1.432

Studies on aeration and water supply in some cacao soils of Trinidad.

*Trop. Agriculture, Trin.*, 1943, 20: 89-104, bibl. 5.

1017. BONDAR, G. 633.85

Penão (*Cnidocolus marcgravii* Polh.). Novo recurso oleifero da Bahia. (A new source of vegetable oil in Bahia.)

*Bol. Inst. cent. Fom. econ. Bahia* 12, 1942, from abstract *Agric. Amer.*, 1943, 3: 97.

*Cnidocolus marcgravii* (*Euphorbiaceae*), a native tree of Brazilian forests, produces heavy crops of nuts which have long been used as food and as a source of cooking oil by the inhabitants of southern Bahia. It has been found that this oil belongs to the important drying oil type and is similar to soybean oil. Little exported at present, the tree could be grown in areas too tropical for tung. The wood has recently been used as insulating material in U.S.A. in the refrigeration industry.

1018. ANON. 633.88.51

Increasing quinine production.

*Crown Colonist*, 1943, 13: 457.

New methods of increasing the production of quinine are being tried in East and West Africa and in Ceylon. The



Russian method of growing the cinchona as a short-term crop, harvesting the entire plant when it is 12 to 18 months old, the alkaloids being extracted from the whole plant, is one of these. In Ceylon also forest regulations prohibiting the collection of wild cinchona bark have been annulled following a report by Dr. S. N. Ganguly, the Quinine Technologist of the Department of Science and Industries, that suitable cinchona bark could be collected from the wild and semi-wild trees found in some parts of Ceylon. The Ceylon Department of Agriculture have earmarked certain areas as suitable for cinchona growing and from 300 to 500 acres are to be so cultivated for a start.

1019. MACFAYDN, E. 633.912-1.556.8  
**Methods of tapping plantation rubber.**  
*Crown Colonist*, 1943, 13: 429-30.

An illustrated article describing former and present-day systems of tapping hevea.

1020. MURRAY, R. K. S. 633.912-1.556.8  
**Tapping experiments on budded trees.**  
*Combined Quart. Circ. Ceylon Rubb. Res. Scheme for 1942, 1942, 19: 1-23.*

The paper describes a number of tapping experiments carried out under the direction of the Research Scheme on its own and other estates, using as material some of the more important clones now coming into bearing. Two departures from the normal system of tapping on a half spiral on alternate days (S/2, d/2, 100%) were considered: (1) reduction of intensity to 67% and (2) increasing the intervals between tappings to 4 days and maintaining the intensity at 100% by doubling the total length of the tapping cut (2 S/2, d/4, 100%). In regard to (1) the trees reacted favourably as regards yield to a reduction of tapping intensity (as compared with the theoretical proportion, dry rubber content of latex, incidence of brown bast and girth increment). Nevertheless these advantages do not offset the loss of crop where rubber is selling at remunerative prices. Tapping on a third spiral on alternate days (S/3, d/2, 67%) proved superior as regards yield to the half spiral third daily system (S/2, d/3, 67%). (2) Double four (2S/2, d/4, 100%) and full spiral (S/1, d/4, 100%) are somewhat superior in yield to half spiral on alternate days (S/2, d/2, 100%), but the increased crop is due mainly to low grade rubber resulting from late drip, the great advantage of full spiral tapping found in Malayan experiments not being reproduced here. Both these systems retard the growth of the young tree and are not desirable in the first two years of tapping and there is some evidence that the incidence of brown bast may be increased by their adoption. The main conclusions reached are that in the wet low-country districts alternate day tapping on a half spiral cut (S/2, d/2, 100%) is a suitable system for tapping young budded areas. In later years the cut may be shortened to one-third of the circumference, or the interval may be increased to 4 days or the double four (2S/2, d/4, 100%), or full spiral (S/1, d/4, 100%) may be adopted.

1021. DE SILVA, C. A. 633.912-1.556.8  
**Field experiments on Dartonfield Estate XVII. Comparison of tapping systems (1941).**  
*Combined Quart. Circ. Ceylon Rubb. Res. Scheme for 1942, 1942, 19: 24-32.*

1022. WHELAN, L. A., AND DE SILVA, C. A. 633.912-1.8  
**Field experiments on Dartonfield Estate XVIII. Manuring experiments with mature rubber (1941).**  
*Combined Quart. Circ. Ceylon Rubb. Res. Scheme for 1942, 1942, 19: 33-5.*

Results for 1937-41 are given in terms of yield, girth increment and bark renewal. These were not statistically significant and girth increment and bark renewal were quite unaffected by any of the treatments.

1023. WHELAN, L. A., AND DE SILVA, C. A. 633.912-1.8  
**Field experiments on Dartonfield Estate XIX. Measurements of growth in replanting areas.**  
*Combined Quart. Circ. Ceylon Rubb. Res. Scheme for 1942, 1942, 19: 36-9.*

The 1942 girth measurements of 2 replanting schemes with 4-year-old budded rubber show a significant response to phosphate of  $1\frac{1}{2}$  in. The smaller responses to nitrogen and potash,  $\frac{1}{2}$  in., were not significant. A differential treatment of green cover, envelope forking and spreading, had no effect on girth increase. Little difference in girth was found between trees planted on the platform, trench, or pitted drain systems. Plants budded in the field are still about  $4\frac{1}{2}$  in. in girth behind plants budded in the nursery and planted out as dormant stumps. The bigger trees (girth 19-22 in. approx.) appeared to respond better to organic than to inorganic manures. Younger trees show no differences.

1024. ANON. 633.913  
**Rubber from Mexico.**  
*Agric. Amer.*, 1943, 3: 68-9.

A set of 8 photographic illustrations showing the method of collecting and extracting wild guayule rubber in Mexico.

1025. THOMAS, A. S. 633.913  
**The production and preparation of rubber in Uganda.**  
*E. Afr. agric. J.*, 1943, 8: 231-7, bibl. 4.

In a historical survey reasons are given why rubber plantations failed to prosper in Uganda until 1942, when the Ministry of Supply came to the assistance of the planters. At that time about 10,000 acres of Para rubber were in cultivation, mostly old trees. Now tapping of the wild rubber tree, *Funtumia elastica*, has been taken up again. It offers some difficulty to economic exploitation as it is found only in dense forests and has to be tapped on the herring bone system 20 ft. above the ground. Yields are about  $\frac{1}{2}$  lb. dry rubber per tree. Compared with *Hevea* the coagulation and further preparation of *Funtumia* latex is rather troublesome. It is hoped that through employment of large numbers of workers production will soon be substantially increased. Also rubber vines of the genera *Landolphia* and *Clitandra* are now being tapped in Uganda. Tapping is easier, but the yield is less than from *Funtumia*. The methods for preparing latex of different origin are described. Labour is the limiting factor.

1026. HAYE, K. A. 634.1/8  
**Fruit culture in Baluchistan.**  
*Punjab Fruit J.*, 1942, 6: 1210-2, bibl. 1.

Conditions in the Baluchistan uplands are especially favourable for growing all kinds of hardy fruits. The present situation as regards local fruitgrowing is reviewed. Three development schemes have already been started by the Department of Agriculture for vines and almonds whereby the landowner and the Department work in co-operation for a period of 10 years after which the new orchards are handed over to the owners.

1027. VERMA, S. R. 634.441-1.541  
**A novel mango graft.**  
*Punjab Fruit J.*, 1942, 6: 1183.

Further progress at Patiala State Orchards, Panjaur, with a new grafting method applied to mangoes is reported. [First noted by the author *ibidem*, 1941, 5: 957; *H.A.*, 11: 957.] Briefly, young mango seedlings, 6 weeks old from sowing, embedded in packets of wet moss in which they had germinated were grafted by approach to equally tender shoots of scion trees. The moss packets were supported in small straw baskets attached to the scion branches, two or more packets to each basket according to scion shoots available. The packets were then lightly covered with potting soil to assist growth and to retain moisture. The grafts were separated from the scion trees 10 weeks after

grafting. Thirty-four have survived out of 36. The use of larger scion shoots was not very successful.

1028. LAL SINGH AND KHAN, A. A. 634.441-1.541.5

**Mango budding in situ.**

*Punjab Fruit J.*, 1942, 6: 1195-1206.

The many disadvantages of the method, universal in India, of propagating mangoes by approach grafting are recounted. An alternative method, that of budding seedling mangoes in the place where they are to grow, has undergone successful trials at horticultural stations at Lyallpur and Gurdapur, Punjab, and is proposed as a substitute. The greatest successes in the trials were obtained when the following conditions were observed. The stock seedlings to be 3 years old, the unpetioled budwood 1 year old and to be inserted by the shield method in spring on year-old branches of similar thickness. Preferably the tying material should consist of cotton tape dipped in paraffin wax with a high melting point. The shoots should be ringed 4 inches above the bud a fortnight later. Budding with potted stocks gave poor results. Older trees may be successfully topworked by budding shoots arising from the headed back limbs. The whole question of this method of budding is gone into very fully including its commercial implications and the technical descriptions are clear and well illustrated. The authors urge the immediate adoption of the method on a large scale since owing to the expense and heavy losses incurred by the approach method prices of budded mangoes are so high that only the well-to-do can afford to purchase plants. The authors would like to see the people planting seedling mangoes by the hundred thousand, budding to be undertaken *in situ* by nurserymen at a suggested price of 4 annas per successful take. Or the Punjab Agricultural Department, which has been so successful in its encouragement of citrus production, might take the matter in hand. Since a trained budder budding 20-25 mangoes per day with 75% success costs in wages only 1 rupee a day there should be no financial loss.

1029. LINFORD, M. B. 634.774-2.8

**Influence of plant populations upon incidence of pineapple yellow spot.**

*Phytopathology*, 1943, 33: 408-10.

Studying the influence of plant populations upon incidence of pineapple yellow spot, a virus disease transmitted by

*Thrips tabaci* at the Pineapple Research Institute, Honolulu, the author found that plants spaced 18 in. apart showed a 57.6% higher infection than plants spaced 12 in. apart. This result supports the hypothesis that the virus carrying thrips are blown uniformly over the plot, causing an equal number of infections per unit area. Hence the number of infected plants expressed in percentage is inversely related to plant population density. Fruit weight diminished as population density increased.

1030. EAMES, A. J., AND ST. JOHN, H. 635.627

**The botanical identity of the Hawaiian "ipu nui" or large gourd.**

*Amer. J. Bot.*, 1943, 30: 255-9.

Anatomical studies indicate that the ipu nui, a form of gourd developed by the Hawaiians and used as a vessel until foreign commerce introduced manufactured vessels, was a true gourd, actually a form of *Lagenaria siceraria*.

1031. BOND, T. E. T. 635.648: 632.4

**Pod spot of okra (*Hibiscus esculentus* L.) and a leaf spot of *Hibiscus rosa-sinensis* L. in Ceylon.**

*Trop. Agriculture, Trin.*, 1943, 20: 67-70, bibl. 15.

An account is given of 2 diseases of *Hibiscus*, namely pod spot of okra caused by the fungus *Ascochyta abelmoschi*, and a leaf spot of the common red *Hibiscus* caused by *Ascochyta* sp., probably the same fungus, but with slight differences as regards the dimensions of its spores and pycnidia. The diseases are new to Ceylon.

1032. BEACHELL, H. M. 612.014.44: 633.18

**Effect of photoperiod on rice varieties grown in the field.**

*J. agric. Res.*, 1943, 66: 325-40, bibl. 16.

ROQUE, A., AND ADSUAR, J. 633.842-2.8

**Studies on the mosaic of peppers (*Capsicum frutescens*) in Puerto Rico.**

*J. Agric. Univ. Puerto Rico*, 1941, 25: 40-50, bibl. 7.

DODDS, K. S. 634.771-1.523

**The genetic system of banana varieties in relation to banana breeding.**

*Emp. J. exp. Agric.*, 1943, 11: 89-98, bibl. 13.

## STORAGE AND PACKING.

1033. HUKILL, W. V. 664.85.11

**Possibilities for maintaining fruit condition.**

*Proc. Wash. St. hort. Ass. 38th annu. Meet.* 1942, 1943, pp. 83-8.

The need for a more profitable method of using cold storage for apples is discussed. A chart shows the normal life expectancy for Delicious apples subjected to various temperatures from the time they are picked; the advance in ripeness of Delicious under various temperature conditions is also graphically presented.

1034. LESJUK, E. A. 664.85.11

**The keeping quality of apples in an ordinary fruit store. [Russian.]**

*Plod. jagodn. Kulturny*, 1940, No. 3, pp. 52-62.

Trials were made between 1933 and 1938 of the storage life of apples, Michurin and Chernenko varieties, in a common fruit store at the Michurin Central Genetical Laboratory. Both bulk storage and storage in 16-18 kg. boxes was tried and use was made of grease tissue and paraffined paper and of wood wool for wrapping. Temperatures varied from 12° C. to 14° C. in September, 4-2° C. to 9-5° C. in October, 0° C. to 2° C. in November and then gradually rose to 5-6° C. in May. Average humidity was 90% in the first part of the period, rising later to 95-97%. Whereas some summer varieties would only keep about 10 days, some late

ripening varieties kept until May. Wrapping in oiled paper resulted in 30 days longer storage life. Large or bruised fruit did not keep so well as small or whole fruit. Temperature of storage was evidently an all-important factor.

1035. KEDRIN, S. P., AND TRIFONOVA, P. S. 664.85.11

**Characteristics of qualitative variations in the apple. [Russian.]**

*Plod. jagodn. Kulturny*, 1940, No. 3, pp. 63-8.

Attempts were made at the Kuibishev horticultural field station to assess quality in different kinds of apples stored in common store and subjected to varying treatments. The quality was assessed on size, taste, appearance, resistance to bruising and to transport, and grade tables are drawn up showing assessment of the different varieties according to the qualities so assessed.

1036. BERNSTEIN, P., AND MARSHALL, R. E. 664.85.11: 632.19

**A study of internal breakdown of Northern Spy apples in storage.**

*Quart. Bull. Mich. agric. Exp. Stat.*, 1942, 25: 156-62, bibl. 5.

Experiments at the Agricultural Experiment Station, East Lansing, Michigan, confirmed observations that Northern Spy apples of 3½ in. and larger are liable to early internal breakdown. Recommendations are given for picking and



storing. Thus apples larger than 3 in. should be harvested 10 days before the usual picking time and should reach the consumer before the middle of December. If two pickings are inconvenient the large-sized apples should be marketed after not more than 8 weeks' storage. The rest can be stored till March, if kept at 32° F. Large fruits do not suffer from prolonged storage if 5-10% carbon dioxide can be maintained in the atmosphere at 40° F.

1037. TINDALE, G. B. 664.85.11.037 + 664.85.13.037  
Cool storage of apples and pears under "acquisition", 1942.  
*J. Dep. Agric. Vict.*, 1943, 41: 47-54.

After surveying 91 cool stores in Victoria during 1942 the following recommendations were made: Of all pear varieties only Packham, Cole and Nelis can be stored until October-November-December respectively, if kept until October at an atmosphere of 5-8% CO<sub>2</sub> at 29° F. Pears in general should be stored by themselves at 29°-31° F. If the chamber has to be filled up with apples, mature, coloured varieties should be avoided because of the ethylene gas they give off. Pears from cool stores should be ripened at 60° F., Boscs at 65° F. Jonathan apples are liable to soft scald and breakdown if stored at too low temperatures. They should be kept at 36° F. until April, at 34° F. during May and at 32° F. thereafter. Apple varieties susceptible to superficial scald, such as Granny Smith, Stewart, Cleopatra, Delicious, Rome, should not be stored after, say, September. Granny Smiths need wrapping only if it is intended to store them beyond August. The wrapping of 20% of the other above-mentioned susceptible varieties is recommended, if they are to be kept after August. The storage life of Granny Smith could be extended by keeping oil-wrapped in a 5-8% CO<sub>2</sub> atmosphere until October.

1038. WILCOX, J. C., AND WOODBRIDGE, C. G. 664.84.11: 546.27  
Some effects of excess boron on the storage quality of apples.  
*Sci. Agric.*, 1943, 23: 332-41, bibl. 11.

Work carried out at Summerland Experiment Station, B.C., indicates that heavy applications of borax or boric acid to the soil may induce a characteristic browning of the flesh in McIntosh and increase the amount of water core and flesh breakdown in Jonathan. A lowering of fruit storage quality may occur before any discernible injury to leaves or twigs. High positive correlations were found between rate of application of boron to the soil and the boron content of the fruit and between each of these and the amount of injury to the fruit. Seasonal differences and amount of crop affect the degree of injury to the fruit, and when the season is conducive to fruit injury a boron content of 24 p.p.m. or more (dry weight) is likely to lower the commercial value of the fruit. This was achieved in the circumstances of the experiment with a single application of 2 lb. or more of borax or boric acid or with annual applications of 8 oz. or more per tree.

1039. COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUST., AND DEPARTMENT OF AGRICULTURE, N.S. WALES. 664.85.11.038  
Extending the storage life of apples by the use of skin coatings.  
*Agric. Gaz. N.S.W.*, 1943, 54: 110-3.

Results are given of 3 seasons' apple dip experiments, some on a large scale, carried out in N.S.W. The most generally effective dip was an 8% solution of 2 parts castor oil to 1 part dewaxed shellac dissolved in alcohol for Granny Smith, Democrat, Delicious and Rome Beauty in common storage and in cool storage. For Granny Smith a 10% emulsion of peanut oil seems best under the latter condition. The treatment effected a marked retardation of yellowing and gave a less wilted, firmer, crisper and more juicy fruit, controlled Jonathan spot, reduced the incidence of bitter pit and delayed the development of mealy breakdown. A

somewhat sticky film occurs on the fruits at higher temperatures in common storage but not on late varieties treated when the temperature is lower. London Pippin, which is unsuitable for common storage, could not be successfully treated. An emulsion of peanut oil used in the large-scale trials was more effective in some respects than the wax emulsions tried and much reduced superficial scald in cool-stored Granny Smith. It increased wilting, however, and was very sticky on unwrapped fruits. Certain precautions must be taken, especially when castor oil and shellac is used. Thus immature or over mature, very large or very small fruit must not be treated, the correct stage being a green-yellow ground colour, fruit juicy and with a fair amount of flavour. For green varieties, e.g. Granny Smith, the correct ground colour is light green to yellow-green. Rough, careless handling induces mould and there must not be more than a day or two between picking and treating. Treatment during very hot weather should be avoided. Instructions for hand and machine dipping are given.

1040. GREVE, E. W. 634.25-1.564  
Some observations on the use of ventilated containers for packing peaches.  
*56th Trans. Peninsula hort. Soc.* 1942, 1943, pp. 44-6.

Trials with 7 varieties of peach grown in the Delaware Agricultural Experiment Station at Newark showed that spoilage in peaches can be reduced by packing and marketing in ventilated boxes with ventilated linings.

1041. LINEBERRY, R. A., AND BURKHART, L. 664.85.7: 577.16  
The stability of vitamin C in small fruits.  
*Fruit Prod. J.*, 1943, 22: 164-5, 177, bibl. 7.

Under normal conditions strawberries, blueberries, dewberries and raspberries do not lose an appreciable amount of vitamin C within 48-72 hours after harvesting, blueberries showing longest retention. If the fruit tissue of strawberries has not broken down storage at 5° C. to 40° C. does not greatly change the vitamin C content during 2 or 3 days, but if the fruit is injured in any way loss at 25° C. is relatively rapid. Conditions under which fruit keeps well also preserve the vitamin C content.

1042. WOODROOF, J. G., AND CECIL, S. R. 664.85.035.1  
Preserving fruits with sulphur dioxide solution.  
*Fruit Prod. J.*, 1943, 22: 132-5, 155, 166-9, 187, 202-5, 219, 237-41, 253, bibl. 15.

An account of work on the preservation of soft fruits with sulphur dioxide carried out at the Georgia Agricultural Experiment Station, in particular for reasons connected with the war effort. It is pointed out that preservation with sulphur dioxide requires less strategic material than any other. The fruits successfully treated were peaches, strawberries, dewberries, blackberries, etc. Thorough and repeated mixing was necessary to equalize the concentration of the preservative throughout the container. Penetration took from 2 to 24 hours according to the firmness of the fruit and the firming agent used, resistance being least with calcium sulphate. Calcium carbonate was the most effective firming agent for strawberries and calcium chloride for young dewberries. Difficulty was experienced in removal of sulphur dioxide from the product in preparation for consumption. Tests were also made on fermenting sulphur dioxide treated fruits. The fruits had to lose sulphur dioxide down to a concentration of 125 p.p.m. before fermentation began.

1043. WOODROOF, J. G., CECIL, S. R., AND THOMPSON, H. H. 664.85.25.035.1  
Improving the quality of preserves made from sulphited peaches.  
*Fruit Prod. J.*, 1943, 22: 269-72, 283, bibl. 2.

Experiments at the Georgia Experiment Station with sulphur dioxide as a means of preserving peaches in non-metallic containers gave very satisfactory results. Preserves

made from sulphited peaches were found to be practically equal to those made from iced fruits and certainly superior to those made from canned or dried peaches. At the same time the sulphur dioxide treatment is less costly than canning. Detailed instructions are given on the procedure for making preserves from sulphited peaches.

1044. CHARLEY, V. L. S. 664.85.22.035.1  
The cold  $\text{SO}_2$  method of plum preservation.  
A large experimental trial in Kent.  
*A.R. Long Ashton Res. Stat. for 1942, 1943*,  
pp. 117-21.

Technical details are given of the large-scale preservation of nearly 398 tons of plums by the Long Ashton cold  $\text{SO}_2$  method in 1942. Results were very satisfactory, a loss of only  $11\frac{1}{2}$  tons or under 3% being experienced by fermentation.

1045. LAL SINGH AND ABDUL HAMID. 664.85.31.037  
The cold storage of fruits in the Punjab. I.  
Citrus fruits: Malta (*Citrus sinensis*) and  
Sangtra (*C. nobilis*).  
*Indian J. agric. Sci.*, 1942, 12: 757-78, bibl. 32.

The keeping quality of the Sangtra orange (*Citrus nobilis*) and of 5 varieties of the Malta orange (*C. sinensis*) was studied for two years at the first experimental cold storage plant of Northern India at Lyallpur. The best temperature range was found to be  $36^\circ\text{--}39^\circ\text{F.}$ , lower temperature producing chill spot injuries and higher temperature favouring fungal diseases. Large fruits kept longer and in a better condition than small. Wrapping in butter paper helped to preserve the freshness and to isolate diseased fruits. The storage life of the Malta orange varied from  $2\frac{1}{2}$  to  $4\frac{1}{2}$  months according to variety, whilst the Sangtra orange can be kept only for 4-7 weeks. At the beginning of the storage life the loss in weight was greater from the peel than from the juice, later the ratio was reversed. The acid and total soluble content of the juice could not be regarded as an index of quality as the juice was not affected by loss of weight in proportion to decline in taste.

1046. FARKAS, A., AND AMAN, J. 664.85.3.021: 632.4

The action of diphenyl on *Penicillium* and *Diplodia* moulds.

*Palestine J. Bot. (J.)*, 1940, 2: 38-45, bibl. 6.

The action on various moulds of diphenyl vapour, as used for wrapping citrus fruits, was studied at the Hebrew University, Jerusalem. A concentration of 0.08 mg. per litre of air stopped the development of *Penicillium digitatum*, *P. italicum* and *Diplodia* species completely. Spores and older hyphae continued to grow when the diphenyl was removed.

1050. ANON. 664.85.047  
Processing English fruits.  
*Fruitgrower*, 1943, 95: 376, 382.

Some account (by a visitor) of the experiments on drying English fruit, more especially plums, in progress at Ditton Laboratory, East Malling. Plums have been very successfully dried, among the commoner ones Pershore (Yellow Egg) and Kent Bush, while Czar without previous sulphuring makes the best true prune of all. It is suggested that a post-war fruit-drying industry might be established which would be able to absorb the otherwise inevitable wastage of a heavy-yielding year. In England  $5\frac{1}{2}$  lb. of fresh Czar plums produce 1 lb. of dried prunes. Plums may also be treated to preserve more or less the colour and flavour of fresh fruit at least for 6 months (longer periods have not yet been recorded). An apple powder is made from windfall apples, including peel, pips and stalks, and presented in the form of small compressed blocks for use as a sandwich

1047. STAHL, A. L., AND VAUGHAN, P. J. 664.85.653.038

Pliofilm in the preservation of Florida avocados.  
*Yearb. Calif. Avocado Soc. 1942, 1942*, pp. 65-7,  
reprinted from *Bull. Fla. agric. Exp. Stat.* 369.

Avocados Lula, Taylor, Trapp and Pollock were held in good condition for 9 weeks when wrapped in pliofilm and stored at  $42^\circ\text{F.}$  for 2-3 weeks longer than unwrapped fruit. Fruit held at  $37^\circ\text{F.}$  did not soften up normally when removed to room temperature. Loss of weight was negligible compared with that of unwrapped fruit. Picking was at the mature green, hard stage. At ordinary room temperature of  $70\text{--}80^\circ\text{F.}$  pliofilm wrapping doubled the life of fruit which had not previously been cold stored. The early varieties, Booth 8 and Walden, did not react well either to cold storage or pliofilm wrappers.

1048. WADE, B. L., AND KANAPAU, M. S. 635.65  
Ascorbic acid content of strains of snap beans.  
*J. agric. Res.*, 1943, 66: 313-24, bibl. 13.

The ascorbic acid content of 46 hybrid strains and 3 commercial varieties of snap bean was tested at the U.S. Regional Vegetable Breeding Laboratory, Charleston, S.C. The stage of pod maturity had only slight influence on vitamin content. After storage for 48 hours the ascorbic acid content decreased much more rapidly at room temperature than at  $36^\circ\text{F.}$  The leaves had the highest ascorbic acid content followed by the stems, pods and roots. The strains varied from 17.7 mg. to 27.5 mg. ascorbic acid content per 100 g. The richest variety was Bountiful (No. 48), almost equalled by hybrid VBL 46. Although, so far, the higher quality beans have contained much less ascorbic acid than the more fibrous ones the hope seems justified that future breeding work will succeed in combining very high ascorbic content with high quality.

1049. WOLF, J. 664.84.31  
Untersuchungen an Spargel. III. Mitt. Der  
Gasstoffwechsel von Spargel bei verschiedenen  
Temperaturen. (Studies on asparagus. III. The  
gas exchange of asparagus at different tempera-  
tures.)  
*Gartenbauwiss.*, 1942, 16: 525-49, from *abstract*  
*Forschungsdienst*, 1942, Vol. 14, abstr. p. 81.

The determination of the gas exchange ( $\text{CO}_2$  liberated —  $\text{O}_2$  consumed) gives an indication of the storage life of vegetables and fruit, as proved by many investigations. In studying white and green asparagus at  $-0.5^\circ\text{C.}$ ,  $+8.5^\circ\text{C.}$  and  $+16.5^\circ\text{C.}$  the author found that the gas exchange decreases steadily from top to bottom of the shoot. Directly after cutting the gas exchange decreases and reaches a certain equilibrium after some time of storage. The coefficient of temperature decreases during storage.

## PROCESSING.

1050. ANON. 664.85.047  
Processing English fruits.  
*Fruitgrower*, 1943, 95: 376, 382.

Some account (by a visitor) of the experiments on drying English fruit, more especially plums, in progress at Ditton Laboratory, East Malling. Plums have been very successfully dried, among the commoner ones Pershore (Yellow Egg) and Kent Bush, while Czar without previous sulphuring makes the best true prune of all. It is suggested that a post-war fruit-drying industry might be established which would be able to absorb the otherwise inevitable wastage of a heavy-yielding year. In England  $5\frac{1}{2}$  lb. of fresh Czar plums produce 1 lb. of dried prunes. Plums may also be treated to preserve more or less the colour and flavour of fresh fruit at least for 6 months (longer periods have not yet been recorded). An apple powder is made from windfall apples, including peel, pips and stalks, and presented in the form of small compressed blocks for use as a sandwich

spread and for other culinary purposes. Plum pulp minus the stones can be similarly treated. The stones produce a commercial oil.

1051. CRUESS, W. V. 664.8.047  
Dehydration of foods in war-time.  
*Fruit Prod. J.*, 1942, 22: 105-7, 118, bibl. 7.

Abstract of an address to the Northern California Chemistry Society, October 1942. The subject is dealt with in general terms.

1052. MAHONEY, C. H., AND SCHRADER, A. L. 664.85.047 + 664.84.047  
The present status and future possibilities of  
dehydration of fruits and vegetables.  
*56th Trans. Peninsula hort. Soc.* 1942, 1943,  
pp. 44-6.

Tests were made at the Maryland Agricultural Experiment Station with a nine truck central exhaust tunnel with a



conditioning end in which large amounts of material can be dried under approximately commercial conditions. Its capacity for drying was 3-4 dry tons every 24 hours, and the only critical war materials needed were the coils, blower and hardware cloth for the trays. Materials dehydrated successfully were sweet corn, lima beans, soy beans, sweet potatoes, potatoes and 5 varieties of apple. Apples were peeled and cored by machine and the peeled apples were kept from oxidizing to a brown colour by dipping for 30 seconds in thiocarbamide (obtainable as Frulite from the Boyce Thompson Institute). They were then sectioned and the sections were spread on slatted wooden trays, where they received a sulphur treatment with  $\text{SO}_2$  gas in an airtight wooden box for 30 minutes. The natural apple colour was thus satisfactorily preserved. Results varied with different varieties. Work on optimum temperatures and humidities, time of sulphuring, etc., is continuing. Dehydration tests are also being made. Enough has been done to show that high quality products can result from dehydration. The best methods of attaining such quality are being studied.

1053. CRUESS, W. V. 613.2: 664.84.047 + 664.85.047

**The nutritive value of dried fruit and vegetables.**  
*Fruit Prod. J.*, 1942, and 1943, 22: 69-72, 91, 111-4, 136-7, 171-4, 181, biblis. 24 and 16.

A compilation of published information in which the dietary value of dried fruits and vegetables is discussed and compared with that of fresh foods.

1054. BALLANTYNE, J. A. 664.85.047

**Fruit drying.**

*Agric. Gaz. N.S.W.*, 1943, 54: 61-5.

Instructions are given under separate heads for drying the following fruits: sliptone peaches, clingstone peaches, prunes and plums, the latter for home use only, apples and pears. A note is given on sulphur burning. Present-day sulphur has much poorer burning qualities than pre-war sulphur and suggestions for coping with this are given, including a sketch of a simple sulphur burner made from a petrol tin and devised to ensure a controllable draught.

1055. JEWELL, W. R. 664.85.047

**Drying and processing tree-fruits.**

*J. Dep. Agric. Vict.*, 1943, 41: 85-97, 110.

An account is given on the investigations into various aspects of the processing of dried fruit carried out in Victoria, by the Fruit Processing Committee. The following subjects are discussed: *Apricots, peaches, pears*:—Procedure for sulphuring these fruits and nectarines and resulphuring when necessary after wet and humid weather, with notes on the moist pack for apricots. *Prunes*:—Selection of fruit and whole drying process including dipping previous to drying. *Apples*:—Selection of fruit, peeling and coring, trimming and slicing, sulphuring, drying and sweating. *Factors essential to produce a high-grade pack*:—General notes and notes concerning particular fruits. *Pest control*:—By fumigation. *Methods of analysis*:—Determination of sulphur dioxide and of moisture.

1056. DURHAM, H. E. 664.85.047 + 664.84.047

**Some methods of drying fruits and vegetables.**

*Gdnrs' Chron.*, 1943, 114: 35.

Some methods of drying fruits and vegetables at home are described. Tomatoes are scalded to remove the skins, cut up and stewed with an occasional stirring on a moderate stove. When well pulped (12-48 hours) they are passed through a press or sieve, then returned to the stew pan and gently evaporated down until the consistency of putty. This thickened pulp is spread  $\frac{3}{4}$  inch deep in well greased baking tins on a warm stove top. The pulp dries in a day or two to cardboard thickness and can then be rolled up and stored. Five pounds of fruit will fill a box used for 100 cigarettes. Before use in soup, stew, etc., a preliminary soaking is given. With slight modifications apples, pears

and quinces can be similarly dried. Peeled and cored apples (not cut in rings), threaded on sticks and suspended in the warmth (a drying cupboard heated only at the week-ends is instanced) make an excellent product. The use of sweet varieties is suggested as they can be eaten without sugar. Peas and beans dry well in similar warmth if given a preliminary scalding before shelling. Scalding prevents further ripening and if done before shelling there is less loss of substance by diffusion.

1057. ZECK, E. H. 664.85.047: 632.7

**Pests of dried fruit.**

*Agric. Gaz. N.S.W.*, 1943, 54: 67-71.

Notes and illustrations are given of some 10 varieties of insects infesting dried fruits in New South Wales. Control measures consist of fumigation with various substances of which some details are given.

1058. NICHOLS, P. F., AND REED, H. M. 664.85.047

**Shipping dried fruits to the tropics.**

*Fruit Prod. J.*, 1943, 22: 206-8, 247-9, bibl. 1.

This paper was first published in the September 1931 issue of the *Western Canner and Packer* under the title "What happens in the tropics". The following recommendations were made after a full discussion of the factors involved in the preparation of dried fruit for shipment to the tropics:—(1) Sealed tin or glass containers must be used. (2) The minimum sulphur dioxide content for apples should be 1,000 p.p.m.; for apricots, peaches and pears 2,000 p.p.m. (3) When the sulphur dioxide content declines to half the above amounts the fruits should be processed, resulphured and repacked. (4) Unless the fruit is to be treated as in (3) vacuum sealing is preferable. (5) Cold storage where available should always be used. (6) Processing and resulphuring were distinctly beneficial compared with "natural condition". (7) Vacuum packed containers gave slightly better protection than cans filled with hydrogen and the latter were better than air-packed cans.

1059. (COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, AUSTRALIA.) 664.85.11.047

**Notes on the dehydration of apples in Australia.**

*Fruit World, Melbourne*, 1943, 44: 2: 5-6, summarized from *Food Preservation Quart. C.S.I.R. Aust.*, undated.

About 4,000 tons of dried apples will be produced in Australia and Tasmania during 1943. The principal varieties used are, in Tasmania where most of the drying is done, Sturmer, French Crab and Cleopatra, in W. Australia Rokewood, Granny Smith and Dunn's Favourite, in S. Australia Rome Beauty and Cleopatra. For economy in preparation fruit should be free from bad blemish, mature and firm, and about  $2\frac{1}{2}$  to 3 inches in diameter. Before sulphuring, which is essential to prevent browning, the apples are peeled, trimmed, cored and held in a 3% to 5% solution of common salt until required. In Tasmania the apples are sulphured (usually insufficiently) by passing the unsliced fruit through a gas-tight box charged with sulphur fumes. The fruit passes through the box in 30 to 45 minutes absorbing 2 grains  $\text{SO}_2$  per lb. en route, whereas 7 to 10 grains  $\text{SO}_2$  is desirable for efficiency. Slicing before sulphuring increases absorption considerably. In S. and W. Australia sulphuring is by dipping the sliced fruit in a  $2\frac{1}{2}$ % solution of metabisulphite, now almost unobtainable. Alternative methods have been tried. Dipping slices in a solution of  $\text{SO}_2$  gas in water is satisfactory but unpleasant for the workers and therefore commercially unsuitable. A  $1\frac{1}{2}$ % sodium sulphite solution, treated for alkalinity by acidifying to a pH value of 3-4 by the addition of 66 ml. of concentrated hydrochloric or 18 ml. of concentrated sulphuric acid per 100 g. of anhydrous sodium sulphite in solution, is the most, though not entirely, satisfactory substitute. In direct sulphuring more  $\text{SO}_2$  is retained if the slices are dipped for 3 minutes in a 2% solution of sodium citrate

before drying. For dipping a strong solution, pH 3-4, in which slices  $\frac{3}{8}$  in. thick are dipped for 6 minutes, gives the best results. Experimental results are tabulated to show that the faster the rate of drying during the first hour the greater will be the amount of  $\text{SO}_2$  retained. In commercial practice the temperature at loading should be  $169^\circ\text{F}$ . with a relative humidity of 20%, and  $140^\circ\text{F}$ . at the farther end of the tunnel, the tray load not exceeding 2 lb. per sq. ft. These conditions should result in a drying time of 4 hours.

1060. MRAK, E. M., PHAFF, H. J., AND FRIAR, H. 664.85.23.047

**Dehydration of cherries.**

*Fruit Prod. J.*, 1943, 22: 198-201, 214, bibl. 7.

1. Satisfactory dehydrated sweet cherries can be made by dipping in  $\frac{1}{2}\%$  boiling sodium carbonate for 5-10 seconds to check the skins and then dehydrating at  $150^\circ\text{F}$ . 2. Royal Anne cherries should be sulphured after dipping for 15-30 minutes and then dehydrated at  $150^\circ\text{F}$ . 3. The stones may be removed but considerable loss of juice results.

1061. ANON. 664.85.25.047

**Drying clingstone peaches. Procedure recommended by Fruit Processing Committee.**

*J. Dep. Agric. Vict. Aust.*, 1943, 41: 97, 104.

The procedure for drying Clingstone peaches as recommended by the Fruit Processing Committee, Victoria, Australia, is described.

1062. MRAK, E. M. 664.85.421.047

**Dehydration of guavas.**

*Fruit Prod. J.*, 1943, 22: 170, 181, bibl. 8.

The advisable procedure for dehydrating guavas as determined at the University of California from 6 varieties grown at Riverside Experiment Station involves sulphuring for 20 minutes and dehydrating at  $150^\circ\text{F}$ . An air flow of 600 lineal feet per minute and an initial relative humidity of 25% are satisfactory for good drying. Time varied from 9 to 19 hours according to variety. The sulphuring facilitated ascorbic acid retention.

1063. ANON. 664.85.047

**Report on work of Research Station, Merbein, submitted to the Advisory Committee of the Station.**

*J. Coun. sci. industr. Res. Aust.*, 1943, 16: 37-40.

The report deals briefly with such subjects as:—seasonal studies in maturity, potash substitutes for use in dipping substances, cotton seed oil as a substitute for olive oil in dipping sultanas, storage trials on apricots and peaches packed in tins, control of mould on racks and dehydration of damaged fruit, packing house treatment of rain-damaged sultanas and lexiás, viticultural investigations, oleic acid supplies.

1064. CRANG, A., AND OTHERS. 664.84.047: 581.192

**A comparison of the ascorbic acid content of stored peas, beans and parsley dried by various domestic methods.**

*A.R. Long Ashton Res. Stat. for 1942, 1943*, pp. 129-37.

Experiments of a preliminary nature were made to see whether various methods of drying vegetables under domestic conditions yielded appreciable differences in the vitamin C content and cooking qualities of the stored product. The chief points noticed were:—1. Peas dried and stored under domestic conditions yielded products higher in vitamin C when heat was used for drying than when the peas were dried in the air. 2. Dried beans were less satisfactory than beans stored in salt. In both cases the vitamin C in the beans cooked after storage was very small. 3. The method of blanching used before drying the vegetables made a considerable difference to the dried product. 4. The method of covering for storage is an important factor in retaining the vitamin C content. 5. Two methods of drying

parsley gave good results, though there was a high loss of vitamin C during storage in jars which were not air-tight. [Authors' summary.]

1065. HOHL, L. A., AND HAAS, V. A. 664.84.047

**Experiments with dehydrated powdered vegetables.**

*Fruit Prod. J.*, 1943, 22: 305-8, 317, bibl. 4.

Carrots, spinach, asparagus and peas were dehydrated and powdered in a variety of ways at the University of California. Asparagus, peas and spinach were best blanched and drum dried as a puree. Of the pre-cooking treatments tested a short blanch in flowing steam was most suitable for flavour, keeping qualities, and texture, whilst unblanched samples were more satisfactory with reference to colour and reconstruction ratios. The reconstituted vegetables were found to be acceptable to children.

1066. MACKINNEY, G., FRIAR, H. F., AND BALOG, E. 664.84.047

**Sulfured dehydrated vegetables.**

*Fruit Prod. J.*, 1943, 22: 294, 315.

The investigations were carried out at the University of California. The composition of dipping solutions and the concentrations of  $\text{SO}_2$  for sulphur treatment of dehydrated asparagus, broccoli, cabbage, carrots and cauliflower are indicated in 2 tables. The initial temperature of the dipping solution was  $65-69^\circ\text{F}$ ., rising to  $82-85^\circ\text{F}$ . after 15 seconds immersion of the hot, blanched vegetable. The development of hay flavour in cabbage and carrots was checked at  $90^\circ\text{F}$ . if the product was sulphured, even though it was stored in fresh air in sealed containers, and the ascorbic acid and carotene content was kept at a high level. Since losses of  $\text{SO}_2$  in these vegetables are low, sulphuring has to be carefully controlled.

1067. PERKINS, M. S. 664.85.047

**A brief résumé of fruit drying and packing.**

*Fruit Prod. J.*, 1942, 22: 46-7, 75-6, bibl. 8.

**FRIAR, H., AND MRAK, E. M. 664.85.732.047**

**Dehydration of huckleberries.**

*Fruit Prod. J.*, 1943, 22: 138-9.

CRUESS, W. V., AND FRIAR, H. F.

664.85.63.047

**Dehydration of olives.**

*Fruit Prod. J.*, 1942, 22: 116, 124.

1068. FABIAN, F. W., AND BLUM, H. B. 664.84.035.2

**Preserving vegetables by salting.**

*Fruit Prod. J.*, 1943, 22: 228-36, bibl. 3.

Preliminary results from 128 experiments conducted on salting five different vegetables (peas, string and Lima beans, corn and okra) at the Michigan Agricultural Station are discussed. Corn and green string beans could not afterwards be distinguished from the canned product. Peas and Lima beans were less satisfactory in flavour.

1069. BLUM, H. B., AND FABIAN, F. W.

664.84.035.2: 577.16

**The influence of salting upon vitamins A and C in vegetables.**

*Fruit Prod. J.*, 1943, 22: 273-5, 283, bibl. 8.

The influence of salting upon the vitamin A and C content of Alaskan peas, sugar peas, string beans (whole and cut), maize, Lima beans, and cucumbers was studied at the Michigan Agricultural Experiment Station, East Lansing. Samples were salted at  $60^\circ$ ,  $70^\circ$ ,  $80^\circ$ ,  $90^\circ$  salometer. Unblanched vegetables in high salt concentrations suffered the smallest losses in carotene and ascorbic acid, the latter being always greater than the former. The changes in carotene varied from +9% for Lima beans to -51.3% for cut string beans in unblanched samples and -19.7% for Alaskan peas to -77.8% for cut string beans in blanched samples. Ascorbic acid losses ranged from 39.6% for Alaskan peas to 86.1% for whole string beans in unblanched



samples and 44.8% for maize to 88.5% for whole string beans in blanched samples. In the process of freshening some carotene and almost the entire ascorbic acid were lost.

1070. ATKINSON, F. E., AND STRACHAN, C. C. 631.56: 664.85 + 664.84  
**Home processing of fruits and vegetables.**  
*Publ. Canada Dep. Agric. 744, 1942, pp. 27, being Fmr's Bull. 114.*

This bulletin which is most usefully illustrated by photos and diagrams contains directions for the following among other operations in the home:—drying of fruits and vegetables, sun drying apricots, the production of apple, grape, tomato, apricot and prune juice, apple syrup and vinegar. Finally a detailed account is given of the construction of a juice press.

1071. BLAIR, E. V. 664.85.036.5 + 664.84.036.5  
**Home canning in 1943.**  
*Minn. Hort., 1943, 71: 79-82, bibl. 1.*

Instructions are given for the home canning by pressure cooker or hot water bath of a large number of fruits and non-acid vegetables. The requirements of each variety are separately dealt with.

1072. ENGSTED, G. 663.813  
**Musttillverkning och kristiden. (Fruit juice production in the present emergency.)**  
*Fruktodlaren, 1942, No. 4, pp. 115-6.*

It is argued that fruit juice production should not be discontinued during the present emergency. There are nearly 140 fruit juice factories in Sweden, mostly run on a collective system, the shareholders being home gardeners who send their surplus fruit to the factory and receive juice in return. In 1941 about 600,000 litres of apple juice were produced from about 1,000 tons of fresh apples. The State encourages the setting up of such factories and has been contributing 15,000 Kr. a year towards the scheme since 1938. Anticipating a great demand for fruit juice after the war, it is considered necessary to support this industry now.

1073. ANDRAE, W. A. 663.813: 634.11  
**Recent developments on fortification of apple juice with vitamin C.**  
*Canad. Fd Pkr, 1943, 14: 2: 13-4.*

The application is described of a method of fortification of apple juice with vitamin C outlined by the Dominion Experimental Farm, Ottawa, as first undertaken by the Co-operative Monterigienne, Rougemont, Que. Unfortified apple juice may not be issued to the troops. The chief difficulty encountered was some loss of the added ascorbic acid during processing. 4.4% of the added vitamin is lost on mixing, pasteurizing and filling and about 20% on storage in the can. Much of the juice is spilled during the rapid action of the can closing machine, an equivalent amount of the added ascorbic acid then being lost. It is suggested that about 10% of the ascorbic acid could be saved if the crystalline vitamin C was added to each container individually. A machine for doing this is not yet available and possibly the tablets could not be produced cheaply enough. Fortified apple juice at the end of the year contains at least 35 mg. ascorbic acid per 100 ml. juice, thus comparing favourably with citrus fruit juice in respect of vitamin C content.

1074. FORGACS, J., AND TANNER, F. W. 663.813: 634.11: 632.3  
**Longevity of pathogenic bacteria in apple juice.**  
*Fruit Prod. J., 1943, 22: 295-9, 304, bibl. 22.*

Longevity of *Escherichia coli*, *Eberthella typhosa*, *Salmonella aertrycke*, *S. schottmülleri* and *S. paratyphi* was determined in apple juices at the University of Illinois. In general,

clarified, unpasteurized juice was more bactericidal than unprocessed or clarified-pasteurized juice.

1075. CHARLEY, V. L. S., AND OTHERS. 634.11-1.563.5  
**The treatment of apple pomace prior to drying for subsequent pectin extraction.**  
*A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 89-100.*

Trials showed that great loss of jelly strength occurred when wet, twice-pressed pomace was stored in slab or in disintegrated form for 6 days, half of it on the first day. Treatment with 1,500 p.p.m.  $\text{SO}_2$  noticeably retarded loss, especially in first 3 days of storage. The losses in jelly strength during storage were very variable, which would appear to indicate that the variety and condition of fruit before milling may also have had an important bearing on the quality of the pomace.

1076. CHARLEY, V. L. S., LING, A. W., AND SMITH, E. L. 634.11-1.563.5  
**Apple pomace silage. Report on experiments conducted in 1941.**  
*A.R. Long Ashton Res. Stat. for 1942, 1943, pp. 101-6.*

Trial shows that the high salt content in unextracted apple pomace successfully conserved as silage by the addition of salt makes it useless as stock feed. Extracted pomace can be satisfactorily ensiled alone, yielding good silage readily eaten. Given simple precautions during silage the waste material is negligible. No special attention or equipment is necessary. Extracted apple pomace can be ensiled as a mixture with grass cuttings, say 1 part by weight of grass to 6 parts pomace. The silage is acid but readily eaten. Chopped straw and extracted pomace are not readily ensiled together owing to their great disparity in bulk.

1077. PEDERSON, C. S., AND BEATTIE, H. G. 663.813: 634.7  
**Preparation and preservation of juices from certain small fruits.**  
*Fruit Prod. J., 1943, 22: 260-4, 281, 287, bibl. 12.*

Investigations were made at the New York State Agricultural Experiment Station, Geneva, on the best methods of preparing and preserving fruit juices from red and black raspberries, dewberries, and strawberries. The best juices were obtained by forcing chilled fruit, to which 12% sucrose had been added, through 4 screens at 49° C. In pasteurization trials organisms in the less acid juices from dewberries, blackberries, black raspberries, strawberries were not killed so readily as in the more acid red raspberry juice. Higher sterilization temperatures appeared, therefore, essential in the less acid berry group. The use to which screened fruit juices after application of sugar syrup and in some cases of citric acid can be put is described. Juices won by pressing through a hydraulic press deteriorated quickly in storage. A blend of 22.2% black raspberry juice, 1% sugar, 76.8% apple juice, however, gave satisfactory results. Blends of red raspberry and apple and elderberry and apple juice proved also good. The best strawberry juice was obtained when frozen strawberries were thawed in apple juice heated to 180° F. and then pressed. Of the 81% yield in juice 38% was strawberry and 62% apple.

1078. CHARLEY, V. L. S., KIESER, M. E., AND STEEDMAN, J. 634.723: 663.813  
**Production of black currant syrup. A. Utilisation of pomace residues. B. Production of syrups with high ascorbic acid contents.**  
*A. R. Long Ashton Res. Stat. for 1942, 1943, pp. 110-6.*

Optimum conditions for the extraction of residual ascorbic acid from once or twice pressed black currant pomace have

been determined [and are here discussed]. The production of syrups with high vitamin C contents from concentrated fresh black currant juice is described and the stability of the products over a 6-month period is given. [Authors' summary.]

1079. CHARLEY, V. L. S., KIESER, M. E., AND POLLARD, A. 635.11: 663.813  
**A note on the production of a concentrated syrup from table beet.**  
*A.R. Long Ashton Res. Stat. for 1942, 1943,*  
 pp. 122-3.

Concentrated beet syrup, the simple extraction of which is described, kept satisfactorily over a period of 3 months and retained full fluidity at a gravity of 1.378.

1080. CRANG, A., AND JONES, D. P. 633.63: 663.818  
**Experiments on the domestic extraction of sugar from sugar beet.**  
*A.R. Long Ashton Res. Stat. for 1942, 1943,*  
 pp. 124-8.

Domestic methods of extraction of sugar beet are described. They are somewhat wasteful of fuel. Other methods of dealing with sugar beet for domestic use are discussed.

1081. COCO, G. L. 663.813: 635.64  
**Tomato paste as a source of tomato juice.**  
*Fruit Prod. J., 1943, 22: 303-4, bibl. 3.*

Investigations carried out at the Food Research Laboratory of the Riverbank Canning Company, California, show that diluted tomato paste is equal in taste to and richer in ascorbic acid content than commercial tomato juice. Tomato paste for juice purposes can be concentrated to 5-6 times the concentration of juice which means a considerable saving in cans.

1082. ANON. 635.64: 631.56  
**New method of processing the tomato for the production of tomato pulp and Vitaminol.**  
*Int. Rev. Agric. Rome (Mon. Bull. agric. Sci. Pract.), 1942, 33: 463T-4T.*

A note of a process apparently described in *Tecnologia chimica*, No. 6, 1942, in which tomato pulp is obtained by crushing the tomatoes without heating, the seeds and skins being separated from the pulp. The product is treated mechanically, again without heating, till homogeneous, when it is filtered through a special filter press (Patent G. Diefenbach, Monza). This gives 2 products, unaltered tomato pulp and "vitaminol", an amber-coloured liquid, of pleasant taste and smell containing the essential vitamins of the tomato. The absence of heat in the process ensures the full retention of vitamins and flavour.

1083. CHAMPLIN, S. H. 634.1/7-1.56  
**Refractometer chart for fruit butters.**  
*Fruit Prod. J., 1943, 22: 279.*

Reprints of this chart for fruit butters in the range 40-48% sucrose are available without charge.

1084. WOODROOF, J. G., AND CECIL, S. R. 664.84.615  
**Processing watermelon rinds for food.**  
*Fruit Prod. J., 1942, 22: 73-4, bibl. 3.*

The State of Georgia, U.S.A., produces 1½ million watermelons annually while 16 other States produce more than a million each. The rind refuse consists of about 50% of which about one-third could be satisfactorily processed for preservation as food such as pickles, preserves, candied melon, etc. Peeling is best accomplished by means of a

simple machine containing a series of rotary knives, hand peeling being costly and lye peeling leaving a rough fibrous surface. To preserve, the rinds may be pickled for 14 days in sodium chloride brine which may be changed after the first 7 days, or sulphur dioxide to make 1,000 parts per million may be added to the final solutions, or after the 14th day the brine may be entirely replaced with sufficient sulphur dioxide to make a concentration of 2,000 p.p.m. By a fourth method the prepared rinds are packed straight into sulphur dioxide solution at 2,000 p.p.m. concentration plus .02% calcium as calcium carbonate for firming. The last method used experimentally gave firmer rinds and a better appearance after many weeks of storage. Before consumption sulphur dioxide prepared rinds require cooking for 1½-2 hours with frequent replacements of water as it boils off.

1085. ROBERTS, E. A. H. 633.72: 581.192  
**Relation of tea fermentation to normal respiration.**  
*Nature, 1943, 152: 77-8, bibl. 6.*

The author replies to criticism of his contention that the mechanical damage required to bring about complete oxidation of the polyphenols in the tea leaf is sufficient to suppress the greater part of the normal respiratory activity, and that carbon dioxide produced in fermentation is due to a secondary oxidation of carbohydrates with the *o*-quinones as one of the necessary H-acceptors. A summary is given of the evidence supporting this view.

1086. BARAVE, R. V., AND AMRUTE, P. V. 634.58-1.57  
**Groundnut oil for diesel engines.**  
*Curr. Sci., 1943, 11: 403-4, bibl. 1.*

Groundnut oil was used in one of two diesel engines rated 165 b.h.p. in the power house at Sangli, India, without loss of efficiency compared with the twin engine which was running at the same time on the orthodox light diesel oil known as grade A. Compared with B grade crude oil, which now has to be used, groundnut oil showed (1) an absence of black smoke from the exhaust, (2) less carbon deposit on the piston head or in the combustion chamber. Consumption was about the same. In view of the shortage of crude oil the matter is worth attention.

1087. ROUSSEAU, A. 634.63-1.56  
**Fabrication rationnelle de l'huile d'olive par pressage. (Approved methods of manufacture of olive oil by pressing.)**  
*Fruits Primeurs, 1942, 12: 9-12, 45-8, 71-2.*

CELMER, R. F. 634.8-1.57  
**Research on tartrates. 1. A solution process for removing wine-stone and recovery of tartrates.**  
*Fruit Prod. J., 1943, 22: 292-3.*

JOHNSTON, F. B. 663.813: 634.11  
**Vitamin C fortification of apple juice.**  
*Fruit Prod. J., 1943, 22: 195-7, bibl. 3.*

PEILE, R. M. 663.3 + 664.85.035.5  
**Fruit juices and jellies.**  
*J. Dep. Agric. Vict., 1943, 41: 155-6.*  
 Recipes for home use.

POLLARD, A. 635.13: 663.818  
**The development of acidity in carrot juice and treacle and the nature of the acid products.**  
*A.R. Long Ashton Res. Stat. for 1942, 1943,*  
 pp. 107-9, bibl. 2.

ANON. 664.583  
**Pickles and sauces.**  
*J. Dep. Agric. Vict. 1943, 41: 105-10.*  
 Recipes for home manufacture.



## NOTES ON BOOKS AND REPORTS.

1088. SALISBURY, E. J. 577.9  
*The reproductive capacity of plants. Studies in quantitative biology.*  
 G. Bell & Sons, London, 1942, pp. 244, pls. 8, bibl. 138, £1 10s.

The reproductive capacity of plants, involving the interaction of seed production, dispersal and germination, and the survival value of the progeny in relation to competition, is a subject that has received relatively little attention in the past. Professor Salisbury's book should therefore serve as a basis and an incentive for a more intensive study of the vital statistics concerned in these factors. It is based almost solely on the painstaking labours of the author and those who assisted him in this work. Figures are given with reference to the seed production of over 240 British species of plants, and "data of one kind or another are furnished respecting nearly six hundred species". The general conclusions drawn are the result of "the examination of some hundreds of thousands of individual plants and of considerably more than three-quarters of a million of their fruits". The data have been assembled into 101 tables and these with their statistical analyses will interest the professional botanist. The amateur field botanist will probably be more attracted to the passing references to other aspects of certain wild plants that have come to the author's notice. For example there are interesting notes on the corncockle (p. 148, seeds exceptionally large and contain a poisonous glucoside), yellow iris (p. 170, seeds of two forms, disc-shaped and plano-convex), foxglove (p. 185, fluctuation in population numbers), and deadly nightshade (p. 190, method of seed dispersal). The frontispiece is a striking illustration of the distribution of the foxglove in a felled wood, and there are seven other plates, each with two illustrations reproduced from photographs. There are also 35 text figures of drawings, diagrams, graphs and maps, including eight drawings of types of fruit and seed. Chapter VII is an interesting illustrated account of "Vegetative multiplication in relation to competition". Of two references to Piper, cited on p. 48 and p. 213, the first (1940) reference is missing from the bibliography on p. 235 and should presumably read Piper, C. S., 1940. *Emp. J. Exp. Agric.* 8, 199-206, while the second (1941) reference is erroneously given as 1931 in the bibliography. H.W.

1089. WALLACE, T. 632.19: 633/635  
*The diagnosis of mineral deficiencies in plants by visual symptoms. A colour atlas and guide.*  
 H.M. Stationery Office, London, 1943, pp. 116, 10s. net.

The origin and purpose of this work are expressed in the preface as follows: "During the past two years, the Agricultural Research Council have been concerned in co-ordinated investigations at a number of Agricultural Research Institutes, University Departments and Advisory Centres, designed to increase our knowledge of the frequency and importance of abnormalities in crop development caused by deficiencies of those minerals, particularly trace elements, that are essential for normal plant growth, and of the methods by which such deficiencies may most effectively be remedied. In these investigations, the diagnosis of specific deficiencies by changes in the appearance of the leaves has played an important part. Dr. Wallace, whose studies in this field are widely known, has collected a valuable series of colour photographs, showing the appearances characteristic of different deficiencies in a wide range of horticultural and agricultural crops commonly grown in this country. It seemed to the Council that they would be performing a useful service, not only to research workers, but also to agricultural advisory officers, to practical farmers, to fruit growers and to gardeners, by making this collection easily available to all who might be interested in a subject

that has gained additional importance during the war, as a result of bringing into cultivation large areas of land on which no crops had previously been grown for many years. Attention may be called to the method, devised by Dr. Wallace, of diagnosing particular deficiencies from the changes produced in a selected series of indicator plants." The Introduction states: "This book has been written primarily for the use of technical officers and advisers concerned with problems of crop production, and for progressive farmers, vegetable growers and fruit growers, but it is thought that it will not be without interest and of use to the large body of the general public who are interested in gardening in peacetime and to whom the growing of food crops has become of vital importance during the war." The main part of the book consists of 114 coloured plates illustrating symptoms of deficiencies of phosphorus, potassium, calcium, magnesium, iron, manganese and boron and a few resulting from other causes such as virus disease and insect attack in twenty-eight different crops. These plates are arranged according to the deficiency—a method which shows how far symptoms of any particular deficiency differ from one crop to another, but which does not seem the most convenient from the point of view of a grower trying to decide which deficiency his crop is suffering from. This main part is preceded by five chapters of letterpress. The first three are on general principles. In chapter IV there are short descriptions of the symptoms followed by a guide to the common symptoms listed under the crop headings: Cereals, Brassicas, Beets, Potatoes, Beans and Peas, Clovers, Carrots and Parsnips, Tomatoes, Fruits, with cross references to the plates. Chapter V gives practical details on the use of the method and lists a number of complications in the use of the visual symptoms. These alone raise the hope that some of the non-expert people for whom the book is produced will not act precipitately in applying remedial measures. If the book leads to symptoms being drawn to the attention of experts promptly it will do much good. W.A.R.

1090. LAMM, R., AND LENANDER, S. E. (ALNARP). 635.1/7

Redogörelse för stamförsök och statskontroll av köksväxstammar vid statens trädgårdsförsök år 1939. (*Annual report of the State Experiment Station for vegetables at Alnarp for 1939.*) [English summary 6 pp.] Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri- Trädgårdsinstitut*, 1940, pp. 114.

Trials on promising strains of different kinds of vegetables are fully reported and notes are given in the summary of varieties showing specially desirable characters.

1091. ARGENTINA, MINISTERIO DE AGRICULTURA. 634: 635

*Memoria de la Direccion de Frutas y Hortalizas Ano 1940, 1941, mimeo.* pp. 171; *Idem, Ano 1941, 1942*, pp. 173. (*Reports of the Horticultural Department, Ministry of Agriculture, Argentina.*)

The reports deal chiefly with administrative and commercial matters concerning the fruit and vegetable industries of Argentina and are presented largely in the form of statistical tables.

1092. CAWTHRON. 632.19: 634/635  
*Annual Report Cawthron Institute for 1941.*  
 Nelson, N.Z., pp. 34.

Fruit research carried out at the Institute is discussed on pp. 15-20. Magnesium deficiency in apples at Braeburn



was greatly reduced by the application of magnesium carbonate to the soil the previous season at the rate of 2 lb. per tree. In other localities response was not entirely satisfactory. Leaves at the tips of shoots of magnesium-deficient trees contained about twice as much magnesium as the leaves at the base of the leader. Magnesium content of the extreme tip in healthy and unhealthy trees was 50% higher than that of the leaves; in other parts of the shoot it was slightly lower than that of the leaves in magnesium-deficient trees and about 50% less in healthy trees. Lime was highest in the old leaves and potash in the tip leaves. A technique is described for rapid colour demonstration of magnesium and potash deficiencies by ashing and spraying the ashed leaf on a porous tile with sodium cobalt nitrite for potash and Titian yellow for magnesium. In apple stock experiments the Double Vigour stock is giving more vigorous trees and more fruit than Northern Spy with Statesman apple scion. *Tomato investigations.* The presence of "cloud" in glasshouse tomatoes at Annesbrook enabled a detailed examination of the disease to be made. About 13% of the fruit was affected, some plants being free and others very susceptible. Cloud occurred equally on plants of high and low yield and on all trusses from the lowest upwards but with a marked falling off after the 6th truss. Injection of various nutrients into the stem had no effect. Hard core was prevalent, especially on the lower trusses. Stem injection with boron and magnesium increased the incidence of the condition while ammonium chloride somewhat reduced it. Vetomold and Globelle tomato kept free of tomato leaf mould but yields were lower than with sprayed Dreadnought. Research on deficiencies, nutrition and diseases of tobacco receives mention.

1093. CEYLON, COCONUT RESEARCH SCHEME. 634.61  
Annual Report of the Coconut Research Scheme  
for 1941.

*Sessional Pap. Ceylon XI, 1942, pp. 19, 40 cents.*

The following notes are summarized from reports of the technical officers. *Germination.* The third leaf stage, the earliest at which a proper selection of seedlings may be made, is a safe stage for transplanting. Very few roots will then be damaged and 60% of the kernel will still be available as a food reserve for the seedlings. Contrary to general opinion the greater part of the potash in the husk is rapidly leached out and is not available to the first roots, which in any case do not ramify round the husk but go straight into the soil. Manuring the nursery soil with potash gave a marked improvement in growth and general appearance. Some of the biochemical changes within the nut during germination are recorded. *Dwarf palms.* Detailed field observations are continuing. Over 1,200 dwarf palm seedlings in 3 varieties have been planted on the Ratmalagara Estate for experimental purposes. Early yields are associated with a high proportion of empty nuts, possibly because of some nutritional deficiency in the soil. Related observations on tall palms show that generous annual manuring of transplanted seedlings is required from the second year to ensure an optimum nut set after the first flowering. *Selection.* Leaf counts will probably be found to be the most reliable of biometrical observations on young seedlings for comparative studies. There is an inflorescence primordium in the axil of every leaf, and the larger the number of leaves produced within a certain period the larger should be the number of inflorescences which may develop under normal conditions into bunches of nuts. Habit of growth is difficult to define concisely. In a field experiment, where some record of habit was necessary, every one of 576 seedlings was photographed at 18 months after transplanting. *Planting material.* The demand for selected planting material has broken all records, 89,566 seed nuts and 8,332 seedlings having been supplied by the Scheme, and a minimum of 1,300 acres has been planted. *Manuring.* In the NPK biennial manurial experiment which has been in progress for some years phosphoric acid has given no yield

increase; nitrogen at the first level  $N_1$  gave a barely significant yield of 9%.  $N_2$  depressed this increase to 4%. Potash gave increased yield of 12%  $K_1$  and 18%  $K_2$ . In co-operative estate experiments the very large increases obtained by manuring palms on poor lateritic soils have been maintained. *Fodder grass.* In the 2nd year of the experiment the growing of fodder between palms depressed yields by 17%. When fodder is not grown 4 lb. of sulphate of ammonia applied to each palm reduced yield of copra by 12%. When fodder between the palms was similarly manured the increase in yield of copra was 9%, probably because of consumption of excess nitrogen by the fodder plants. Yield of fodder, manured or unmanured, under palms has been poor.

1094. INDIA, IMPERIAL COUNCIL OF AGRICULTURAL  
RESEARCH. 633/634  
Annual Report of the Imperial Council of  
Agricultural Research for 1941-42, 1943, pp.  
130, 7s. 3d.

The report covers Indian agriculture in general, only information of horticultural interest, i.e. that on pp. 16-23, *Fruit*, being abstracted here. The Advisory Board has laid down the lines on which horticultural research in India should proceed for the first 10 years, with revision and extension after 5 years as may be necessary. The aim is to ascertain from the point of view of quality and yield the best varieties for the country and the most suitable methods of growing them. *Madras.* Kodur. Citrus rootstock trials: Jamberi and gajanimma stocks worked to chinee orange had produced the largest trees in 29 months. Jamberi proved the best stock for acid lime. Kichili, ranked as a vigorous stock for chinee orange, failed to maintain its rate of growth after 18 months. Gajanimma and rough lemon stocks budded with chinee orange develop a wider lateral than downward rootspread. Success of the Nakamura method of side-grafting mangoes (described *H.A.*, 1939, 9: 1428) depends on scion variety and current weather conditions. Results of root grafting experiments with mango have been encouraging. *Bombay.* A cytological study of papaya is in progress. Gas storage experiments with Alphonso mango and Nagpur orange ended March 1942; results are not given. *Bengal.* Krishnagar Experiment Station. Budding experiments with mango and citrus failed. In a banana manurial trial ash of banana trash plus compost proved beneficial. *United Provinces.* Chaudhuria. Apple stocks resistant to woolly aphid are being grown, particularly Merton 779 and some Russian seedlings. Resistance is not communicated to the scion. Superphosphate but not nitrogen or potash applications increased the growth of unfruited apple trees. Catch crops have not affected tree growth and except for potato are unprofitable. Malling type XIII continues resistant to *Rosellinia* fungus. Control of stem black, brown, and pink diseases was obtained by painting the forks of branches with a paste of red lead and copper carbonate 1:1 in lanoline. Cropping of apples was unaffected by lichen growth on the branches. Well rotted organic matter applied to sandy soils proved toxic to apple borer. The soil fumigants tested only diffused 3 inches on either side of point of insertion. *Punjab.* Montgomery. Data are being collected with a view to standardization of the nomenclature of the citrus rootstocks used in India. The stock kharna khatta imparts vigour to sangtra and Malta oranges and Marsh Seedless grapefruit and is useless for Malta blood orange. Jhatti khatti is compatible with bloods but not with sangtra. Mitha is a dwarfing stock. Mokri dwarfs Malas and grapefruit but not sangtra. Ceylon nasranan dwarfs sangtras but invigorates plain Malas. Stored citrus seed became non-viable in 3 months and lost 50% of its germinating power after 15 days compared with fresh seed. The fungi causing withertip of citrus and anthracnose of mangoes have been proved to be identical. *Assam.* Burnihat. Buds of Assam orange can be made to break 22 days earlier if



irrigated after insertion. Bark-grafting succeeds during continuous rains when budding will fail. In citrus root-stock trials the stock rababenga requires the maximum period for bud-break and satkora the least. Pani jamir has the largest amount of lateral coarse and fibrous roots and satkora the least. Assam orange picked semi-yellow and stored at room temperature continues to colour and will keep at least 50 days. Mysore. Hessarghatta. Rome Beauty apple on 8 varieties of stock produced uniformly the same number of branches except on the dwarfing Malling IX. Vigorous Malling XIV is susceptible to collar rot and sunburn. Some of the budded stocks formed protuberances at the point of union. The addition of sheep manure to NPK combinations improved growth. Inarching a large girdled tree with 3 Northern Spy stocks having saved it the process is to be tried experimentally with apple trees suffering from collar rot. *Fruit and vegetable preservation*. The centre of activity is the Punjab and considerable success has been obtained in a number of experiments which are briefly noticed. Others are in progress. The scheme from 1 July, 1942, has been taken over by the Punjab Provincial Government.

1095. MISSOURI. 634/635  
*Annual Report of the Missouri Agricultural Experiment Station for 1938-39*, being Bull. 444, 1942, pp. 106.

Horticulture is dealt with on pp. 64-70. Among projects of general interest are the following: Nutrition of carrots; influence of soil temperature on cucumbers; apple scab control; virus diseases; vine nutrition; biennial bearing control; pruning; ringing; apple manuring; induction of sexual reproduction in young apple trees by various cultural devices; reproduction in relation to function of flower producing hormone ("florigen"). Evidence has been accumulated that a hormone, florigen, is responsible for the initiation of flower buds and thus the induction of reproduction in plants. The most promising lead of the possible biochemical mechanism of initiation of sexual reproduction appears to be by means of the carotinoid-vitamin A-like substances.

1096. NEBRASKA. 634/635  
*Fifty-fifth Annual Report Nebraska Agricultural Experiment Station, 1941, 1942*, pp. 96.

The only items of horticultural interest concern the winter hardness of certain apple varieties, experiments in potato

storage and breeding, carrot and tomato breeding with a few lines on vegetable mulching.

1097. NEW YORK STATE HORTICULTURAL SOCIETY. 634.1/8  
*Proceedings of the 88th Annual Meeting, N.York St. hort. Soc., January, 1943, 1943*, pp. 263.

The meetings, which were held at Rochester and Kingston, were largely concerned with wartime problems. Among other subjects briefly dealt with are the following:—apple scab and cedar-apple rust control; harvesting, picking and packing apples; the incidence of fruit pests and diseases in 1942; arsenical injury on peaches; codling control [see also abstract 829]; summer control of red mite.

1098. WASHINGTON. 634/635  
*Fifty-first annual report for the fiscal year ended June 30th, 1941*, being Bull. Wash. agric. Exp. Stat. 410, 1941, pp. 142.

The Division of Horticulture reports briefly on experiments in orchard cover cropping, potatoes, propagation, spray injury and residue, attempts to propagate apple by cuttings, winter injury to fruit trees, factors affecting fruit set, spot disease of pears, orchard irrigation and other problems.

1099. IMPERIAL AGRICULTURAL BUREAUX. 631.531: 635.1/7  
*The production of seed of root crops and vegetables. Joint Publication of the Imperial Agricultural Bureaux*\* 5, 1943, pp. 95, 3s.

The production of seed of vegetables and root crops and its organization in the following countries is outlined:—England, Scotland, Netherlands, Sweden, U.S.A., Canada, New Zealand, South Africa and the Colonial Empire.

1100.  
The following reports also have been examined:—  
*A.R. Dep. Agric. Basutoland for the year ended 30th September, 1942*, pp. 16.  
*Rep. Dep. Agric. British Honduras for the year 1941, 1942*, pp. 9.

\* In this case the Bureaux of Horticulture and Plantation Crops, Pastures and Forage Crops and Plant Breeding and Genetics.

